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# ***JPRS Report***

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# **Science & Technology**

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***USSR: Life Sciences***

# Science & Technology

## USSR: Life Sciences

JPRS-ULS-91-014

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28 June 1991

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**Immunomodulating Properties and Antitumoral Activity of Block Copolymers of Ethylene Oxide and Propylene Oxide (Proxanols)**

917C0217A Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 6, Nov-Dec 90 pp 918-924

[Article by I. N. Topchiyeva, V. N. Yerokhin, Ye. B. Burlakova et al.; Moscow State University imeni M. V. Lomonosov, Department of Chemistry; Institute of Chemical Physics imeni N. N. Semenov; USSR Academy of Sciences; VONTs; USSR Academy of Medical Sciences]

UDC 615.27.6.4

[Abstract] A study of the effect of block copolymers of ethylene oxide and propylene oxide (proxanols) on the activity of natural human killers showed preliminary processing of mononuclear cells of the peripheral blood by the copolymers for three hours and washing did not reduce the viability of the cells but amplified the cytotoxic activity of the lymphocytes against natural killer-sensitive target cells K562 in vitro. The proxanols demonstrated definite antitumoral properties, especially in relation to ascitic tumors. Injection of hydroperoxide groups into the macromolecules intensified the antitumoral effect. The proxanols' activity was determined mainly by the membranotropic properties of its main copolymer chains. It was assumed that the increase of effectiveness of proxanols as an immunomodulator and their antitumoral activity may be achieved by using proxanols conjugates with low-molecular immunostimulators. Figures 4; references 16: 10 Russian, 6 Western.

**Effect of Opiate Neuropeptides on Cholinoreactivity and Adrenoreactivity of Cells of Rat Sensomotor Cortex**

917C0217B Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 6, Nov-Dec 90 pp 889-894

[Article by O. Kh. Koshtoyants, M. Yu. Antipina and M. A. Kulikov; Institute of Higher Nervous Activity and Neurophysiology; USSR Academy of Sciences; Moscow]

UDC 612.821

[Abstract] A comparison of features of reactions of nerve cells to noradrenaline and acetylcholine against the background of the effect of the neuropeptides dalargin and beta-endorphin involved acute experiments on 250-280 g rats immobilized by d-tubocurarine. Subcutaneous injection of these peptides changed the distribution of cells according to the types of reaction and the intensity of reactions of the neurons to the injected neuromediators. The findings of this study combined with data in the literature concerning the dependence of behavioral

effects of endocrine opiates on the state of neuromediator systems confirmed the assumption of the participation of "classical" neuromediators in mechanisms of the effect of neuropeptides on processes of training and memory. References 10: 8 Russian, 2 Western.

**Impact of Radiation in Magnesium Line in Reverse Transcription Process**

917C0256C Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 314 No 4, Oct 90 (manuscript received 24 Apr 90) pp 988-990

[Article by T. A. Telegina and P. P. Fedchenko, Institute of Limnology, USSR Academy of Sciences, Leningrad; Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow; All-Union Scientific Research Institute of Agricultural Meteorology, Obninsk, Moscow Oblast]

UDC 577.215

[Abstract] The effect of radiation of magnesium lines in the visible spectrum on reverse transcription, which is the most important process in the retrovirus life cycle, was investigated on viral RNA prepared from potato virus M. The kinetics of cDNA synthesis in response to light in magnesium lines were photographed for 20, 40, 60, and 90 min and without light, with the amount of <sup>32</sup>P label incorporation measured using two techniques: calculation of cDNA radioactivity after absorption from DE-81 filter paper, and removal of radioautographs from the electrophoregram of synthesized cDNA. The results suggest that irradiation with light in magnesium lines decreases the amount of cDNA synthesized in the system proportional to the amount of irradiation. Furthermore, data on incorporation of the radioactive label in the DNA suggest that irradiation in magnesium atoms affects the reverse transcription process by inactivating the magnesium-dependent enzyme reverse transcriptase. It is hoped that these results may find application in the search for methods of inactivating retroviruses such as HIV. Tables 1; references 6: 5 Russian, 1 Western.

**Membrane Potential Modulation of Calcium Pump Activity in Smooth Muscle Sarcolemma**

917C0256D Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 314 No 4, Oct 90 (manuscript received 12 Mar 90) pp 990-993

[Article by S. A. Kosterin, L. G. Babich, and V. P. Fomin, Institute of Biochemistry imeni A. V. Palladin; Ukrainian SSR Academy of Sciences, Kiev]

UDC 577.352.5:577.352.4

[Abstract] The effect of the membrane potential on magnesium, ATP-dependent transport of calcium was investigated on a fraction of plasma membrane vesicles

of smooth muscle cells obtained from porcine myometrium. Changes in the fluorescence of a potential-sensitive probe employed to measure the electric potential  $\Delta\psi$  in the vesicle membrane indicated that the electric potential stimulates calcium pump activity in smooth muscle sarcolemma fragments closed from the cytoplasmic side out. Further investigation of the effect of  $\Delta\psi$  on the ratio of the initial rate of the transport process to the concentration of ionized calcium showed that polarization of the vesicles results in an increase in the number of calcium pump gates, but that the affinity of the transport system to calcium does not change. Subsequent analysis of the potential-dependent calcium pump in the  $\Delta\psi$  range of 0 to -35 mV suggested that a single positive charge is sent inside the inverted vesicles of smooth muscle sarcolemma during the elementary transport process. The data thus demonstrate that the calcium pump activity of smooth muscle sarcolemma modulates the membrane potential. These findings may find application in the realization of the effect of mediators and physiologically active substances that depolarize and regulate the tonic contraction of smooth muscle. Figures 4; references 8: 5 Russian, 3 Western.

#### Structural and Functional Relationships in $\alpha$ -Interferons. Investigation of Antiviral Activity of Human $\alpha_2$ -Interferon Mutant Forms

917C0256E Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 314 No 4, Oct 90 (manuscript received 16 Jul 90) pp 998-1001

[Article by I. I. Shekhter, M. T. Bulenkov, V. P. Veyko, K. I. Ratmanova, L. V. Yevdonina, O. G. Kulakova, V. L. Yurin, and V. G. Debabov, All-Union Scientific Research Institute of Genetics and Selection of Commercial Microorganisms, Moscow]

UDC 577.112+575.22.224

[Abstract] A hydrophilic segment of human  $\alpha_2$ -interferon (amino acids 30-50) that connects two  $\alpha$  helices was selected for investigation of its structural and functional activity and determination of the role that the individual amino acids play in the development of the antiviral domain. The techniques involved included the use of mutant proteins with gradual substitution (scanning) of the amino acid residues and site-directed mutagenesis. The results indicated that fragment 42-50 evidently has no functional activity, while fragment 31-42 of human  $\alpha_2$ -interferon is responsible for the antiviral activity of the protein on human cell line A549, participates in the formation of the receptor site, and governs the species specificity of this subtype of interferon. The data also showed that amino acid F-38-S was the most critical to the formation of the active form of interferon. The identical nature of changes in the antiviral activity of mutant interferon forms for porcine and human cell lines indicate high affinity interaction of  $\alpha_2$ -interferon with heterologous organism receptors,

which serves as additional proof of the broad specificity of this protein class. Tables 1; references 15: 1 Russian, 14 Western.

#### Mass-Spectrometric Study of Some New Derivatives of Alkaloid Lupinin

917C0267A Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 4, Jul-Aug 90 (manuscript received 13 Nov 89) pp 508-512

[Article by U. A. Abdullayev, R. T. Tlegenov, A. A. Abduvakhabov and K. U. Uteniyazov; Institute of Bioorganic Chemistry imeni Academician A. S. Sadykov; UzSSR Academy of Sciences; Tashkent]

UDC 547.944/945+543.51

[Abstract] A search for new physiologically active compounds involved a study of mass spectra of new derivatives of lupinin with use of spectra of metastable ions. Review mass spectra were photographed on a Varian MAT-311 device with use of a system of direct input at a temperature of the ionization chamber at 100-120°, ionizing voltage of 70 V and ionizing current of 300  $\mu$ A. Daughter ions were recorded in direct analysis of the daughter ions regime by scanning accelerating voltage from 1000-3000 V. Units of mass of signals in spectra of metastable ions were calculated by the standard method. Study of direct analysis of the daughter ions showed that ions with  $m/z$  152-150 are very important during formation of low-mass quinolizidine ions. Figures 2; references 9: 8 Russian, 1 Western.

#### Synthesis and Anticholinesterase Activity of Some Derivatives of Alkaloid Lupinin

917C0267B Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 4, Jul-Aug 90 (manuscript received 13 Nov 89) pp 513-515

Article by R. T. Tlegenov, D. N. Dalimov, Kh. Kh. Khaitbayev et al.; Institute of Bioorganic Chemistry imeni Academician A. S. Sadykov; UzSSR Academy of Sciences; Tashkent]

UDC 547.94:577.153.4.047

[Abstract] A search for reversible inhibitors of cholinesterases involved synthesis of some derivatives of the alkaloid lupinin and the study of their anticholinesterase activity. The new derivatives of lupinin derived and their iodomethylates proved to be potent reversible inhibitors of acetylcholinesterase and butylcholinesterase. Figures 1; references 3: 2 Russian, 1 Western.

**The State of Monolayers of Crown Ethers of Different Structures at the Water-Air Phase Boundary**

917C0375A Tashkent UZBEKSKIY

BIOLOGICHESKIY ZHURNAL in Russian No 5, 1990  
(manuscript received 20 Nov 89) p 61

[Article by U. Z. Mikhordzhayev, Kh. F. Abdulayev, A. K. Tashmukhamedova; V. I. Lenin Tashkent State University (Order of Labor Red Banner); under the rubric "Brief Scientific Communications".]

UDC 541.49:577.352.2:547.898

[Text] The biological effects of membrane-active crown ethers are, as a rule, determined by the characteristics of their chemical structure. The macrocyclic polyethers, including the crown ethers, possess the capacity to shift ions of alkaline and alkaline-earth metals through model and biological membranes. In this connection it was of interest to obtain and investigate oriented monolayer films with a structure similar to biological membranes with crown ethers built into them. As a continuation of investigations of the interaction between chemical structure, spatial structure, and biological effect of the macrocyclic polyethers, we studied the behaviors of these compounds at the water-air phase boundary.

The adsorptions of the cyclopolyethers at the water-air phase boundary were investigated by the method described in study (1). The results of our observations showed that the dialkyl-, di-d-oxyalkyl, and the diacyl

derivatives dibenzo-18-crown-6, diethyl-dibenzo-24-crown-8, diethyl-dibenzo-30-crown-10, and ethylbenzo-15-crown-5 form stable condensed monolayers at the air-water phase boundary, by contrast with dibenzo-18-crown-6. It is interesting to note that the crown ethers form stable monolayers which do not have the three-dimensional hydrophobic groups which are characteristic for the usual surface-active molecules. The area accounted for by the crown ether molecule in the monolayer depends substantially on the size of the cavity of the macrocycle, on the nature of the substituents in the benzene ring of the molecule, as well as on the composition, pH, and the concentration of the salts of the alkaline metals in the substratum. With an increase in the concentration of salt in the sublayer, the size of the area accounted for by the crown ether molecule increases. The surface activity and area per molecule of the investigated compounds change depending upon the pH, since changes in the quantitative and qualitative state of the hydrogen bonds between the molecules of water and the corresponding groups of the crown ethers take place.

Thus, stable monolayer films based on surface-active crown ethers have been obtained and investigated. It was established that the conformation of the crown ether at the water-air phase boundary changes during the formation the complex between the macrocyclic polyethers in the surface layer and the cations of the sublayer.

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**"Lipid" Hypothesis of Oxytocin Binding to Plasma Membrane of Smooth Muscle Cells**

917C0256B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 314 No 4, Oct 90 (manuscript received 15 Feb 90) pp 984-987

[Article by V. K. Rybalchenko, Kiev State University imeni T. G. Shevchenko]

UDC 612.014+577.352.315

[Abstract] Data on the channel-conductance of phosphatidyl-serine bimolecular lipid membranes in the presence of oxytocin were employed in order to clarify how oxytocin interacts with membranes. An investigation of the surface activity of the hormone and its interaction with lipid monolayers and monolayers from plasma membrane fractions showed that the hormone molecules

are incorporated into the membrane with the formation of ion-conducting channels that enhance conductance in azolectin- and plasma membrane bimolecular lipid membranes. The asymmetry and nature of the current curves indicate that the channels formed may be opened or closed depending on the membrane potential. These data lay the foundation for a hypothesis about the primary mechanisms of oxytocin binding with the plasma membrane of smooth muscle cells. The essence of this hypothesis is that oxytocin, due to its surface activity, is concentrated on the interface and incorporated into the plasma membrane lipid matrix with the formation of a potential-dependent channel structure. This hypothesis satisfies questions regarding why oxytocin causes smooth muscle to contract and relax while increasing tonus and why oxytocin, a calcium-pump blocker, does not substantially alter phase contractions. Tables 1; references 10: 9 Russian, 1 Western.

**The State of Health of Children and Adolescents of Districts Subjected to a Radiation Effect, and Some Problems of Clinical Examination and Treatment**

917C0478A Minsk ZDRAVOOKHRANENIYE  
BELORUSSII in Russian No 12, Dec 90 pp 3-6

[Article by N. A. Gres, T. I. Polyakova, A. N. Arinchin, S. M. Zelenko, G. V. Nalivayko, A. M. Dubovtsov, T. S. Morozevich, S. I. Tochitskaya; Belorussian Scientific Research Institute [NII] of Radiation Medicine; under the rubric "Original Research"].

UDC 612.014.482-02:621.311.25]-071:578.08

[Text] Abstract. A screening examination of 2,480 children and adolescents of four districts of Belorussia with varying densities of radiocesium contamination identified a low "quantity and quality" of the health of the subjects overall. Changes in relation to the thyroid gland, the blood, and the lymphatic and nervous systems, as well as a higher frequency of chronic pathology of the ENT organs, predominated in the regions subjected to radioactive contamination as compared to the control. The results of these investigations point to the necessity of creating a system of specialized clinical examination and treatment of the population, which will include improved evaluation of the state of health and comprehensive ecological monitoring of the environment.

Biblio.: Four titles, 3 tables, 1 illustration.

Key words: screening examination, radiation, health groups, endemic enlargement of the thyroid, anemic syndrome, children, adolescents.

The accident at the Chernobyl NPS created a special ecological situation on a significant territory of the BSSR, a situation requiring the carrying out a complex of urgent measures for the preservation of the health of the population, especially children and adolescents. Clinical examination and treatment were assigned principal roles in this system of measures. However, the indices of the estimation of health which are generally accepted at the present time in public health, namely birthrate, morbidity, and mortality, reflect the sum of those processes which take place in the organism, and which we find out about after years. The goal of medicine at this stage is to study the "quantity and quality" of the health of the population, to identify the formation in the organism of changes reflecting the processes of adaptation of the child population of the republic to the ecological situation which has taken shape in Belorussia, and to create a program of dynamic monitoring of the state of health.

At the present time the objective has been set for assessing the state of health of children and adolescents living on territories with different densities of contamination with radionuclides of cesium, and substantiating some principles of specialized clinical examination and treatment.

Material and methods. In the course of 1989, we examined 2,115 children and adolescents of the Cherkovskiy (Mogilev Oblast), Vetkovskiy (Gomel Oblast) and Volozhinskiy (Minsk Oblast) districts, which had been subjected to radiation contamination as a result of the accident at the Chernobyl NPS, and 365 school children of the control Braslavskiy district of Vitebsk Oblast, living in conditions of the natural radiational background (Table 1).

**Table 1. Characterization of the BSSR Districts Examined**

Residence districts	Number of children examined	<sup>137</sup> Cs content in the soil, Ci/km <sup>2</sup> (1989)
Cherikovskiy	1600	63.2-146.5
Vetkovskiy	350	22.0-47.0
Volozhinskiy	165	2.0-8.0
Braslavskiy	365	background

The examination of the children and adolescents was carried out according to a program of screening which included a pre-physician examination (anthropometry, blood pressure determination, determination of pulse rate, visual acuity, and parental questionnaire), examination by the pediatrician, endocrinologist, optometrist, neurologist and otorhinolaryngologist, general analysis of blood and urine, and ECG. The data were analyzed by the generally accepted methods of variation statistics.

Results and discussion. The assessment of the state of health of the subjects was carried out taking account of

their distribution with respect to health groups (Table 2): group 1, healthy children; group 2, those considered practically healthy, but with functional deviations or a history of complaints; group 3, patients with chronic diseases in a stage of compensation; group 4, patients with chronic diseases in a stage of subcompensation; and group 5, patients with chronic diseases in a state of decompensation. The low number of children and adolescents in health group 1 was characteristic for all the districts, including for the Braslavskiy control district.



Table 2. Distribution of the Children and Adolescents of the Monitored BSSR Districts by Health Groups (%)

Health groups	Residence districts			
	Cherikovskiy	Vetkovskiy	Volozhinskiy	Braslavskiy
Children (6-14 years)				
1	9.7	3.9	1.4	8.6
2	71.4	69.4	77.2	74.2
3	17.6	25.7	21.4	17.2
4	1.3	1.0	-	-
Adolescents (15-17 years)				
1	6.0	4.9	4.2	11.0
2	70.2	59.2	60.0	57.6
3	23.8	35.9	23.9	28.0
4	-	-	2.9	3.4

Note: Statistically significant differences were not identified with respect to the parameters analyzed

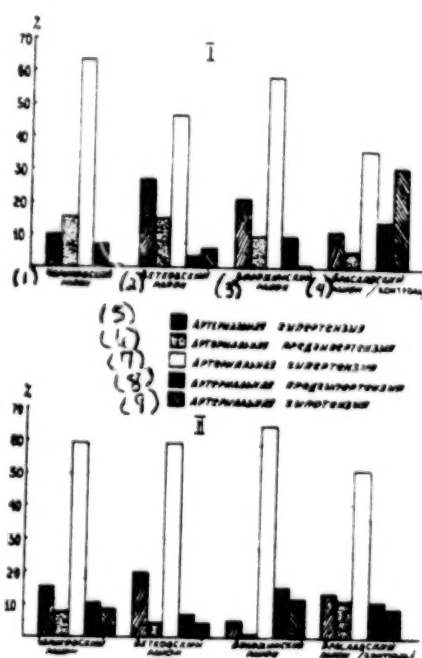
Assessment of the physical development of the subjects did not reveal a statistically significant difference in the groups under observation. The level of harmoniously developed children and adolescents ranged from 56.0 - 65.0 percent. School children with excessive body weight predominated, with respect to the republic and the country as a whole, among the children with disharmonious development (25.4 - 29.3 percent).

The information obtained in the assessment of the structure of health group 2, which is the most numerous, representing 57.6 - 77.2 percent, is of special interest. It is made up primarily (50.0 - 67.5 percent) by children and adolescents with first and second degree thyroid enlargement.

Analysis of the hemograms did not reveal substantial deviations in the children and adolescents of the control Braslavskiy district: the lowest red blood cell counts ( $3.0 - 3.5 \times 10^{12}/l$ ) and hemoglobin (70 - 100 g/l) were detected, respectively, in 2.1 percent and 0.8 percent of the subjects. At the same time, in a one-time analysis of the blood, 34.7 percent of the children ( $p < 0.001$ ) in the Cherikovskiy district had an anemic syndrome primarily of mild degree. Hepatomegaly was observed on the average in 5.0 percent of the subjects of each group. A generalized increase in the lymph nodes was recorded most frequently in the Vetkovskiy district, and was 16.4 percent as opposed to 1.4 percent in the Braslavskiy district. A regional increase in the lymph nodes, primarily submandibular, was encountered equally frequently in all districts, and ranged from 20.9 - 23.3 percent in the children and from 22.9 - 32.1 percent in the adolescents.

Assessment of the levels of the average arterial pressure (ave. AP) showed that the lowest percentage of children with arterial normotension (41.7 percent) was found in the Braslavskiy district (Fig. 1). On the other hand, a predominance of children with reduced ave. AP was identified there. Thus, the frequency of arterial hypotension in children from 7 - 10 years of age of the Braslavskiy district was 30.6 percent, which is significantly higher as compared

with the stringent control districts ( $p < 0.001$ ). At the same time, a tendency to an increase in arterial pressure was observed in the children of this age group in the Vetkovskiy and Volozhinskiy districts, where the total percentage of prehyper- and hypertension reached 43.2 percent and 33.3 percent, respectively, as against 19.5 percent in the control. There were no significant differences in the ratio of children with various levels of ave. AP in the 11 - 14 year age group, with the exception of a tendency toward the predominance of arterial hypertension in the Vetkovskiy district (21.4 percent).



Key: 1. Cherikovskiy district—2. Vetkovskiy district—3. Volozhinskiy district—4. Braslavskiy district—5. Arterial normotension—6. Arterial prehypertension—7. Arterial hypertension—8. Arterial hypotension—9. Arterial normotension

It was established on the basis of the results of the ECG examinations that the number of children and adolescents with unchanged ECG did not differ significantly in all of the groups under observation, and was 25.8 - 36.6 percent. Various ECG syndromes were encountered identically frequently, with the exception of the syndrome of early ventricular repolarization, the frequency of which exceeded the control values by a factor of 1.5 - 2 ( $p < 0.01$ ).

Health group 3 had no specific peculiarities in its structure. However, a significant increase ( $p < 0.001$ ) in chronic illnesses of the ENT organs was observed in the children and adolescents of the Cherikovskiy (22.5 percent and 28.6 [5], respectively) and Vetkovskiy (29.1 percent and 34.6 [5], respectively) districts as compared with the Braslavskiy district.

According to the data of the screening questionnaire, complaints of an asthenoneurotic character predominated in the children living in the stringent control district (Table 3).

**Table 3. Distribution of the Children and Adolescents of the Monitored BSSR Districts Based on the Results of Parental Questionnaire (%)**

Complaints	Residence districts			
	Cherikovskiy	Vetkovskiy	Volozhinskiy	Braslavskiy
Weakness, listlessness	25.3*	34.8*	32.8*	4.4
Increased fatigability	25.8*	34.8*	24.0*	10.2
Daytime somnolence	20.3*	14.2*	18.4*	7.1
Irritability	32.3	49.0*	37.6*	26.2
Decreased memory	8.4	11.6*	16.0*	6.0
Tremor of hands, body	9.6*	6.5*	20.6*	2.0
Tics	7.3	5.2	4.2	4.8
Headaches	35.3*	47.7*	44.8*	25.8
Dizzy spells	30.0*	23.2*	32.8*	8.4
Fainting spells	2.6	1.3	1.6	3.5
Heart pains	22.6*	23.2*	20.0*	9.5
Nausea	18.0*	27.7*	28.8*	7.3
Vomiting	11.5*	7.7	18.4*	4.5
Abdominal pains	38.4	46.5*	38.8	34.1

Note: \* indicates that the difference is statistically significant in relation to the control (Braslavskiy district)

Thus, statistically significant differences in the distribution across health groups of children living in both contaminated districts and in districts which were deemed clean by convention were not noted on the basis of the data obtained. At the same time, a decrease in erythrocytes and hemoglobin, a generalized enlargement of lymph nodes, and an asthenoneurotic syndrome, and, according to ECG data, a syndrome of early ventricular repolarization were encountered significantly more often in the structure of the children who were subjected to a radiation effect as compared with the control.

Specific regularities with respect to the indices analyzed were not identified in children as a function of the density of radiational soil contamination.

A number of problems were identified in the course of the performance and analysis of the data of this study; without the solution of these problems the high-quality organization of the specialized clinical examination and treatment of the child and adolescent population of the public is impossible.

The first problem is the perfection of the methods of assessment of the state of health and the development of

a screening program for the specialized clinical examination and treatment of the child population which has been subjected to a radiation effect. The principle, according to which the "transition from health to disease" is characterized by a stepwise diminution in adaptability of the organism to the influence of the environment (satisfactory adaptation, strained adaptation, unsatisfactory adaptation, and breakdown of adaptation), as a result of which the zone between the norm and pathology can be divided into borderline, including prenosological, states, must underlie mass examinations [1, 2, 3]. In accordance with the recommendations of the WHO [World Health Organization] [VOZ], mass medical examinations can be divided into two types: the first, epidemiological examination with epidemiological oversight; the second, prescriptive screening. If the epidemiological examination makes it possible to obtain information regarding the prevalence and distribution of diseases, prescriptive screening is directed toward the identification of functional changes or minimal pathological deviations, and combines the diagnostic approach to the assessment of the state of health with the prognostic. A computerized system of clinical examination and treatment with the development of special



programs is needed for the solution of this aspect of medical problems. However, the only real form of assessment of collective health at the present time is the distribution of examinees in the population by health groups. Of the five health groups, the second merits special attention. It is most numerous among the children and adolescents we examined (69 - 74 percent), and carries information regarding the initial changes in the state of health of the population examined. Analysis of mass medical examinations of schoolchildren of the monitored districts of the republic showed that health group 2 is made up primarily of children and adolescents with first and second degree enlargement of the thyroid gland, a transitory anemic syndrome, and arterial hyper- and hypotension. At the same time, not one official medical report contains an analysis of the structure and quantitative characteristics of health group 2. In this context, it is advisable to supplement the existing report forms officially with new forms which include the analysis of the structure of health group 2 and of the indices of the physical development of children and adolescents.

The second problem is the carrying out of bioecological monitoring, that is, the concurrent dynamic assessment of the state of health of man and the environment he inhabits. It has become evident that practical public health at the present time does not have at its disposal a developed methodology for the assessment of the health of the population which takes account of the influence on it of the diversity of environmental factors which may lead to a distorted notion of the degree of safety (or danger) of individual factors. Thus, in connection with the accident at the Chernobyl NPS, we have to establish the true relationship between the radiation dose, the features of its formation, and the character of the responses of the human organism to the chronic effect of relatively small levels of radiation [4].

In addition, special attention should be devoted to the assessment and correction of nutrition in the monitored districts of the BSSR: a shortage of fresh vegetables and fruit, associated with the insufficient supply of these districts with uncontaminated foodstuffs, along with the impossibility of using those grown under local conditions, doubtless contributes to the formation of the anemic syndrome in the children subjected to the radiation effect. The influence of nitrates, pesticides, and other chemical factors on the state of health of the children demands serious study.

Another aspect of the problem resides in the fact that the mass medical examinations which we are attempting to cover the entire population with by using the methods of traveling brigades, resolves only the problems of the assessment of the state of health. Without ecological monitoring it is impossible to achieve the second, no less important objective of clinical examination and treatment, namely the improvement of the health of the population.

#### Conclusions.

1. In all the districts examined, the number of children and adolescents in health group 1 is low, and ranges from 1.4 - 9.7 percent.
2. Deviations in blood, and lymphatic and nervous systems, and chronic diseases of the ENT organs predominated in the structure of health groups 2 and 3 of the child and adolescent population of the stringent control districts as compared with Braslavskiy district.
3. Significant differences as a function of the density of soil contamination were not identified in the state of health of children and adolescents living in the stringent control districts.
4. The creation in the republic of a system of special clinical examination and treatment for children and adolescents which, in addition to improved assessment of the "quantity and quality" of health, should include ecological monitoring of the environment, is necessary for the safeguarding of the health of the population

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#### Method of Recording the Results of Enzyme Immunoassay by Serial Spectrophotometers

917C0478B Minsk ZDRAVOOKHRANENIYE  
BELORUSSII in Russian No 12, Dec 90 pp 15-16

[Article by I. A. Novikova, D. K. Novikov, E. A. Dotenko, B. A. Sukhnenko, V. V. Novikov; Vitebsk Medical Institute; under the rubric "Original Research"].

UDC 576.8.077.3

[Text] Abstract. A photometric system for the recording of the results of enzyme immunoassay is described. The system is used together with SF-26 and SF-46 spectrophotometers to carry out measurements on a standard 96-well (8 x 12) plate. Comparison of the results of the measurements of the immunoenzymatic reaction on an SF-46 spectrophotometer, equipped with the proposed

system, and the Finnish "Uniskan" unit demonstrated their practically complete coincidence (correlation coefficient  $r = + 0.98$ ).

Biblio.: Three titles, 1 table, 1 illustration.

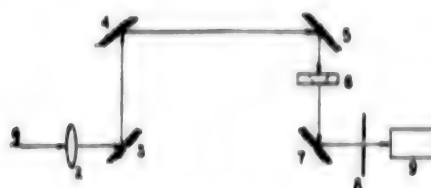
Key words: enzyme immunoassay, serial spectrophotometers, recording method.

Modern clinical laboratory diagnosis requires sensitive, precise, reproducible methods, which include methods of binding, above all it requires the diverse variants of enzyme immunoassay. By combining the high degree of safety and relative technical simplicity, enzyme immunoassay (EIA) is useful for the diagnosis of both infectious and noninfectious diseases [2].

The widespread use of EIA has been impeded above all by a lack of photometers with a vertical beam path, since the technique of the most widely used solid-phase EIA method envisages the setting up of the reaction in flat-bottomed EIA plates.

We proposed to carry out the measurement of the results of EIA on serial spectrophotometers (SF-46, SF-26), equipped with a photometric system developed by us. It consists of a system of mirrors which alters the path of a beam of light from the horizontal plane to the vertical, thus achieving deflectional illumination of the specimens in the well sheet. After passing through the well, the direction of the beams changes to the horizontal, and is oriented toward the photocell of the measurement unit of the spectrophotometer (Fig. 1).

Monochromatic light (1) passes through the lens (2) of the spectrophotometer, falls on the mirror of the photometric system (3), and deviates vertically upward. Through the system of mirrors (4, 5), the direction of the beam of light changes to the opposite (vertically downward). After passing through the specimen to be measured (6), and being reflected from the mirror (7), the



beam of light acquires a horizontal direction, and reaches the photocell of the spectrophotometer (9) through the input window (8). The photometric system is set up over the cuvette section of the basic instrument (with a remote cuvette holder) with the cover of the cuvette section open.

Testing of the photometric system showed that when sheets for enzyme immunoassay produced by the Leningrad Medical Polymer Factory, and by foreign firms, "Linbro", "Dynatech", etc., are used, the range of operative wave lengths includes the visible and infrared spectrum (400-1000 nm). Since the system of mirrors of the photometric system possesses a specific absorption capacity, the slit of the spectrophotometer should be opened wider than when working with similar specimens under the usual conditions.

In order to compare the results of the recording of the EIA by means of the proposed system and SF-46, as well as by means of the Finnish "Uniskan" photometer, we used a test system for the determination of antibodies to a specific hepatic lipoprotein, developed by colleagues of the Department of Infectious Diseases of the Vitebsk Medical Institute, S. V. Zhavoronok, M. L. Dotsenko, and A. L. Kalinin [1]. Since horseradish peroxidase was used as the marker enzyme in the test system, the measurement of the optical density was carried out at the wave length  $\lambda = 495$  nm. The optical density values obtained by means of the instruments indicated above are presented in Table 1.

Table 1. Results of Measurement of Optical Density on a "Uniskan" Photometer and the Proposed Photometric System

"Uniskan"	SF-46 PS
0.271	0.266
0.010	0.038
0.294	0.308
0.422	0.409
0.383	0.386
0.368	0.370
0.343	0.359
0.343	0.348
0.356	0.369
0.215	0.264
0.252	0.299
0.271	0.331
0.315	0.363

**Table 1. Results of Measurement of Optical Density on a "Uniskan" Photometer and the Proposed Photometric System (Continued)**

"Uniskan"	SF-46 PS
0.281	0.311
0.334	0.404
0.303	0.297
0.228	0.264
0.317	0.306
0.497	0.485
0.294	0.300
0.506	0.525
0.450	0.461

The average difference between the two corresponding values of the numerical series was  $0.023 \pm 0.0042$ . The correlation coefficient between the two numerical series, calculated on the basis of the Pearson test, was  $r = +0.98$ .

Similar results were obtained in a study of a test system with penicillinase as the marker enzyme ( $\lambda = 582 \text{ nm}$ ) [3].

The use of serial spectrophotometers equipped with the proposed system makes it possible to increase the sensitivity and precision of photometry in connection with the higher degree of precision of the basic instrument. A valuable property of the photometric system is the rapidity of fitting to the spectrophotometer (3-5 minutes), which offers the possibility of using the spectrophotometer both in the standard measurement mode (horizontal beam path) and for measurements which require a vertical beam path. Since the SF-46 and SF-26 spectrophotometers are available in practically all clinical biochemistry and in many clinical diagnostic laboratories in the Soviet Union, and the cost of the photometric system does not exceed 10 percent of the cost of

the SF-46 prospects are open for the wide introduction of EIA in practical public health.

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## AIDS: Defend or Die

917C0228A Alma-Ata ZDRAVOOKHRANENIYE  
KAZAKHSTANA in Russian No 4, Oct 90 pp 8-9

[Interview with Kazakh SSR Deputy Chief State Public Health Physician Asiya Abdrakhmanovna Kurmangaliyeva by V. Yemelyanov]

UDC 616.98(574.3)

[Text] Like reports from a battlefield, alarming messages of the ever-wider spread of the AIDS epidemic are coming in from different countries of the world. In something less than a month, up to 6,000 new patients are registered on the planet, and one new country with cases of clinically expressed disease is added to the list.

[Yemelyanov] What is the present situation in regard to the spread of HIV infection in our republic?

[Kurmangaliyeva] Kazakhstan has unfortunately joined the regions in which an AIDS patient and 10 HIV carriers have been revealed for the first time. Alas, the results of analyses conducted on 2 April of this year on blood from an inhabitant of Temirtau—a homosexual and a drug addict—were not an April Fool's prank. The diagnosis was certain: AIDS! The patient already underwent a two week course of treatment in the specialized Moscow Infection Hospital No 2 on Sokolinaya Hill and was released to his place of residence. He is now under the observation of Karaganda doctors.

A large commission of the republic's Ministry of Health met in Temirtau and Karaganda with the purpose of investigating this case. Thirty thousand inhabitants of these cities were subjected to laboratory examination for HIV infection. Syphilis was revealed in one resident who had sexual contact with the infected patient. The patient was hospitalized, and 20 of his sexual partners were placed under medical control.

Eight foreign citizens carrying human immune deficiency virus were deported from the republic and the country. Two other carriers—girls aged 8 and 2 years from Bishkul'skiy Rayon, North Kazakhstan Oblast, and Khobdinskiy Rayon, Aktyubinsk Oblast—are currently being treated in Moscow. Both were infected in the course of treatment outside our republic.

The All-Union AIDS Center has now announced that another two inhabitants of Kazakhstan have been infected with HIV. Their blood samples are being analyzed in Moscow. Both suspected carriers are under the observation of specialists at their place of residence, and the possibility is not excluded that the dangerous diagnosis will be confirmed, with the consequence that the difficult task of determining the circle of persons who had been in contact with the patients will have to be carried out.

These examples show how real the danger of AIDS infection is today. We need to consider in this case that

the disease is transmitted not only by sexual means but also from a sick mother to her child during pregnancy, labor, and sometimes even during nursing.

The doctors themselves, laboratory technicians, blood transfusion station specialists and donors also require protection from the virus.

[Yemelyanov] What is being done here to make this shield against the dangerous infection reliable?

[Kurmangaliyeva] The advent of AIDS revealed our unpreparedness for fighting this disease. All other problems have paled in the face of the "plague of the 20th century." Even doctors themselves, not to mention the population, are still poorly informed about the clinical pattern of this disease and its manifestations. This is precisely why the priority task of the day is to describe the origins of the disease, reveal its social roots and etiology, demonstrate the pathways by which it spreads and the particular features of its clinical pattern, diagnosis, prevention and treatment, and finally, develop the rules for working with people suspected of AIDS. This information should be communicated in lay terms through the newspapers, journals, television, movies, radio, lectures and interviews.

We also need dependable material and equipment support, and we need to establish a network of diagnostic laboratories and AIDS prevention and control centers covering the entire republic. As of today, as many as 40 such laboratories and 14 oblast centers have been opened. We can get a feeling for the volume of the work they did last year from the following figures: 1,470,464 persons were examined for HIV infection, which is 566,045 more than in 1988.

Control over observance of disinfection and sterilization rules is being intensified in all therapeutic and preventive institutions. Almost 700 sterilization departments have been opened in large hospitals and polyclinics for this purpose. Steps are also being taken to solve the acute problem of organizing the collection, storage and disposal of used disposable medical articles, and ensuring universal 100 percent reclamation of dressings (tampons, bandages etc.). The indications for infusing blood, blood preparations and drugs, for taking blood tests and for carrying immunizations in nursery schools, children's day care centers and schools are being sharply limited. The safety factor in this area must be not a single percentage point below 100.

[Yemelyanov] Asiya Abdrakhmanovna, we know that human contact is the basis of all human endeavor, which is why the significance of preparing medical personnel entering into professional contact with the so-called "risk contingent"—the prostitutes, drug addicts, homosexuals and bisexuals they are required to examine—is increasing immeasurably. How is this problem being solved?

[Abdrakhmanovna] Western specialists believe that in order for every person and every doctor to become aware

of the primary importance of the AIDS problem, a minimum of three years of daily intensive educational work would be required. Because the HIV infection assumed epidemic proportions later in our country than in others, we have fortunately been provided a chance to retard its development to some degree, and prevent its growth to catastrophic scale. And this would require new knowledge and occupational skills. Hundreds of Kazakhstan physicians and laboratory technicians have undergone special training in institutes for the advanced training of physicians and in central diagnostic laboratories of Moscow, Leningrad, Kiev and Minsk. Interdisciplinary seminars for physicians of different specialties have also been conducted in Uralsk, Kustanay and Alma-Ata. Middle-grade medical personnel are also undergoing training in the republic on the basis of special programs. Nothing is insignificant in this important effort: Human life may become the price of mistakes and omissions.

Great misfortune is knocking at our door. Computer calculations show that by the year 2000, 90,000 of our compatriots will be struck down by the HIV infection, while the number of infected carriers will attain 1-1.5 million. And the sooner all of us become aware that "the menacing Plague Queen is now marching upon us herself, and is relishing a rich harvest", the more effective the fight against the disease of the 20th century—AIDS—will be.

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### Clinical Epidemiology of Q Fever in an Endemic Region

917C0228B Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 4, Oct 90 pp 45-46

[Article by N. T. Yermukhanova, E. Ch. Nauruzbayeva, L. B. Seydulayeva and Sh. A. Kusulbekova, Department of Infectious Diseases (Professor Ye. S. Belozarov, director), Alma-Ata Medical Institute]

UDC 616.981.718-036

[Text] Despite the great successes in significantly reducing the occurrence of many infectious diseases, Q fever is encountered rather frequently today [2,5]. This infection is especially significant in the southern oblasts of Kazakhstan, which are endemic in relation to Q rickettsiosis. Elevated morbidity has been noted here in some years.

The literature contains indications of a direct dependence between seasonal occurrence of the disease, the epidemiological situation and clinical manifestations [1,3,4].

The goal of this work was to study the clinical and epidemiological features of the course of Q fever in different age groups of patients in an endemic zone.

We investigated 350 disease histories in the Enbekshi-Kazakhskiy Central Rayon Hospital from 1979 - 1989. The patients consisted of 55 children from 2 - 14 years old, and 295 adults.

The bulk of the patients entered the hospital with the following diagnoses: viral ear and nose infections, fever of uncertain etiology, brucellosis, pneumonia and typhoid fever. The following tentative diagnoses were established in hospitalized children: viral hepatitis (in 5), acute gastroenteritis (in 15), meningitis (in 6), sepsis (in 2), pneumonia (in 13) and viral ear and nose infections (in 14). This was an indication of the polymorphism of clinical manifestations accompanying Q rickettsiosis. A rise in morbidity was registered in the spring months (76.8 percent). However, disease was also noted in January-February among 56 persons working with livestock. In 25 cases it was noted in the summer months (20 involved schoolchildren).

It was established that infection occurred by the alimentary pathway (consumption of raw milk) and by personal contact (caring for animals) in 185 of the patients. The following was indicated in the disease histories of children: 18 were caring for rabbits and chickens, and 12 had received tick bites while vacationing in mountain Pioneer camps. The epidemiological histories of 126 patients contain references to consumption of untreated water from open-air water sources, and swimming. Among adults, 49 patients lived in the city of Issyk, used summer home plots and raised chickens. Among children living in the city, 15 had fallen ill. Six of them maintained pigeons.

The disease was observed to have an acute initiation in all cases. A serious course was registered most frequently among children from 2 - 12 years old. The infection process was of moderate severity in 94.4 percent of the adults, and it took a severe form in 5.6 percent. The leading symptom constantly encountered in 98.3 percent of the patients was fever. The temperature reaction lasted 2 - 3 weeks, usually within 12 - 15 days. A longer fever was observed in 31 children.

Special mention should be made of the enlargement of lymph nodes (submaxillary, posterior cervical, axillary). It was revealed in 104 of the patients (including all children). Subicteric scleras and pronounced jaundice of skin surfaces were noted in 68 adults and 35 children. Analysis of clinical material from the endemic region revealed exanthema in 16.9 percent of adults and 80.2 percent of children. Moreover differences were revealed in both nature and time of appearance in different age groups. Exanthema was discovered in adults in the 5th-6th day of illness. It bore a papulous-polymorphic nature. Exanthema appeared in children in the very first days of illness, and it was of the spotty (crusty) papulous-petechial type.

Meningeal symptoms were observed in 20.6 percent of children from 2 - 9 years old and in 9.2 percent of adults.



All age groups revealed weakness, poor appetite (in 98.6 percent), nausea (in 60.2 percent) and vomiting (in 35.4 percent). Moreover affliction of the gastrointestinal tract was frequent among children from 2 - 12 years old—distention, diffuse pains in the abdomen, runny stool, and in some cases, laxation (in 6.9 percent of adults).

Affliction of large joints (hip, knee, shoulder) coupled with restricted movement were revealed in persons who had contact with animals and who had suffered mixed infection—Q fever and acute brucellosis with dependable laboratory confirmation, and with identically high titers in serological tests (complement-fixation reaction with *Rickettsia burnetti* 1:80 - 1:160, 1:340; Wright's reaction 1:400 - 1:1600). This was typical of 49.5 percent of the patients.

Changes on the part of respiratory organs were noted within limits corresponding to generally known data (catarrhal phenomena, oral hyperemia, bronchitis). Bronchitis and pneumonia were diagnosed in 35.8 percent of adults and 42.3 percent of children. They were distinguished clinically by severity of course, a long-lasting high fever and pronounced physical data. Lung x-rays revealed no changes.

Enlargement of the liver and spleen was noted. However, the hepatosplenic syndrome was noted as a residual phenomenon for 1 - 2 months in 15 percent of children and 6 percent of adults. Changes on the part of the urinary system appeared in children in the acute period in the form of albuminuria (in 16.2 percent), hematuria (in 10.5 percent) and cylindruria (in 8.9 percent). Similar changes were established in 12.6 percent of adults. They were distinguished by short duration and by rapid normalization of urine tests on the background of antibacterial therapy.

The peripheral blood picture took the form of pronounced leukopenia (in 66.7 percent), relative lymphocytosis (in 55.9 percent) and monocytosis (in 28.4 percent). A high erythrocyte sedimentation rate was noted in children in 49.4 percent of the cases.

Specific antibodies in blood and the complement fixation reaction were observed in examined patients at the end of the first or second week of illness.

Thus significant differences in clinical and epidemiological data were revealed in age comparisons of Q fever patients in an endemic zone. The alimentary and personal contact pathways of infection were typical of adults, while the water pathway and contact with animals were more typical of children. The latter were also noted to suffer a more severe disease course more frequently, together with long-lasting fever, pronounced dermal eruptions, lymphadenopathy and nervous system affliction.

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### Possibilities of Hemosorption by Fibrous Sorbent During Acute Renal Insufficiency (Experimental Study)

917C0209 Moscow *KHIRURGIYA* in Russian No 12, Dec 90 (manuscript received 5 Jul 89) pp 15-18

[Article by O. M. Roteramskaya, M. M. Alimov and A. Kh. Kasymov; Experimental Department (director A. Kh. Kasymov, Doctor of Medical Sciences); Tashkent Branch (director-V. V. Vakhidov); VNTsKH]

UDC 616.36-008.64-036.11-085.38.015.2:615.246.2

[Abstract] Experimental studies of the effect of hemosorption by a fibrous polymer sorbent (polypropylene-polacrylic acid) on some indicators of the general hemodynamics and level of metabolites in blood of animals with acute hepatic insufficiency involved experiments on 27 dogs (weight ranging from 15-25 kg) with a model of obstructive jaundice, complicated by hepatic insufficiency. The polymer fibrous sorbent displayed significant sorption capacity in relation to toxic products of the metabolism, accumulating during hepatic insufficiency in a 30-minute hemosorption procedure. No total protein was lost during perfusion of blood through the sorbent. Arterial blood pressure remained at a functionally acceptable level throughout the hemosorption procedure. The improvement of hemodynamics indicators in the experiments, especially normalization of blood flow through the hepatic artery, was attributed to the decrease of concentration of pathological metabolites in the blood after the hemosorption. References 10; Russian.

### Rapid Test System for Determining Blood Serum Myoglobin Concentration and Adapting it to Diagnosing Acute Myocardial Infarction and Monitoring Thrombolytic Therapy

917C0264A Kazan *KAZANSKIY MEDITSINSKIY ZHURNAL* in Russian Vol 71 No 5, Sep-Oct 90 (manuscript received 21 Mar 90) pp 325-329

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UDC 616.127-005.8-079

[Abstract] A rapid test system was developed using enzyme immunoassay for the early diagnosis of acute myocardial infarction and monitoring and assessing the efficacy of thrombolytic therapy. The study encompassed 90 patients with acute myocardial infarction aged 46 - 72 years. Results from 62 patients with transmural or non-transmural acute myocardial infarction that were treated conventionally showed that nine of those that died had maximum myoglobin levels (1,700-2,021  $\mu\text{g/l}$ ) as compared to those that survived (93-1,270  $\mu\text{g/l}$ ), thus

indicating that myoglobin levels can be used in prognosis. These results also demonstrated that transmural acute myocardial infarction can best be differentiated from the non-transmural variation by using myoglobin levels rather than creatine phosphokinase. Thrombolytic therapy was administered to the experimental group (28 patients) who presented with transmural acute myocardial infarction and were hospitalized within 0.5 to 4 h of the onset of the attack. Recanalization was achieved in 19 of these patients. Two of the nine patients that were unsuccessfully treated died due to low output syndrome. The data indicate that the efficacy of thrombolytic therapy is enhanced when performed within 2 h of the attack. These findings indicate that this rapid test system for quantitative determination of myoglobin is suitable for diagnosis, therapy, and monitoring of acute myocardial infarction and can establish the efficacy of thrombolytic therapy within 2 h after beginning treatment. Figures 6; tables 1; references 21: 7 Russian, 14 Western.

### Efficacy of Combined Use of Plasmapheresis and Hemosorption in Management of Burn Patients

917C0264B Kazan *KAZANSKIY MEDITSINSKIY ZHURNAL* in Russian Vol 71 No 5, Sep-Oct 90 (manuscript received 14 Nov 89) pp 369-371

[Article by A. I. Marchuk, T. L. Zayets, and V. Ye Stankevich]

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[Abstract] Plasmapheresis and hemosorption have both been used separately to manage burn patients by reducing the clinical manifestations of intoxication and the concentration of metabolites in the plasma that contribute to the onset of toxemia. This paper presented the results of an investigation of the combined effect of plasmapheresis and hemosorption on 30 burn patients aged 16-80 years, predominantly men, with burns covering 36 - 70 percent or more of the body. Two variations of treatment were employed: 1) plasmapheresis preceded hemosorption by 2 - 3 days (20 patients); 2) hemosorption preceded plasmapheresis by 2 - 3 days (10 patients). Both of these treatments were followed by measures aimed specifically at correcting homeostasis. In the experimental group, intoxication psychosis was arrested by the end of the first procedure, and the patients regained consciousness and felt better. Fevers decreased by 1-2°C, appetite returned, and the excretory function of the kidneys improved, probably due to the elimination of nephrotoxic metabolites. The sole side effect, which was observed in only 3 percent of cases, was chills, which was easily compensated. The control group exhibited no such improvements and had a fatality rate of 77.3 percent, as compared to 40 percent for the experimental group. These findings indicate that both plasmapheresis and hemosorption should be employed in managing burn patients. Tables 2; references 8; Russian.



### **Ximedon as Stimulant of Reparative Regeneration in Surgical Practice**

917C0264C Kazan KAZANSKIY MEDITSINSKIY  
ZHURNAL in Russian Vol 71 No 5, Sep-Oct 90  
(manuscript received 28 Dec 89) pp 373-375

[Article by O. S. Kochnev and S. G. Izmaylov, Department of Emergency Surgery, Kazan Institute for the Advanced Training of Physicians imeni V. I. Lenin]

UDC 616.346.2-089.87-001.4-003.93-085.276.4

[Abstract] Experimental trials conducted on 173 male rats indicated that ximedon enhanced the elastic strength characteristics in a post-operation cutaneous scar. In addition, histochemical analysis demonstrated that ximedon helps accelerate RNA and collagen accumulation in healing, and heals these wounds better than methyl uracil does. Moreover, ximedon elevates the completion of phagocytosis, which is the final phase of the phagocytic reaction. These results served as the basis for clinical trials in which ximedon (0.5 g/four times per day) was administered to 102 surgical patients at risk for developing purulent complications. Ximedon's efficacy was assessed by the general status and subjective sensation of the patients, the number of days required for body temperature to normalize, blood indices dynamics, number of days before the sutures were removed, number of days in the hospital, and the number of post-operative suppurations and infiltrates into the wound. The results indicated that the experimental group was more active and exhibited less of a febrile reaction. The smooth course of the post-operative period in the experimental patients was also reflected in the quality of wound healing. In addition, patients that received ximedon were discharged from the hospital an average of one day earlier than those in the control group. The enhanced recovery of the experimental groups is attributed to the higher number of lymphocytes and segmented neutrophils, i. e., better defense of the body. These results suggest that ximedon should be made available for widespread clinical use. Tables 2; references 9; Russian.

### **Coagulation of Gunshot Wounds of Liver and Spleen by Plasma Argon Flow**

917C0333A Moscow KHIRURGIYA in Russian No 9,  
Sep 90 (manuscript received 11 Jul 89) pp 59-62

[Article by Ye. I. Brekhov, B. P. Kudryavtsev, S. V. Klepikov et al.]

UDC 616.36+616.411]-001.45-089

[Abstract] A study of the possibility of use of an argon plasma flow to produce hemostasis and sealing of gunshot wounds of the liver and spleen involved an experiment on 36 mongrel dogs of both sexes (weight from 5-20 kg). The experiment employed the use of the plasma surgical device "Fakel-9-2" in a coagulation regime with

current strength up to 30 A, 30-35 V, volumetric expenditure of argon of 1.5-1.8 l/minute and diameter of the microplasmatron jet of 2.4 mm. Animals under hexanol narcosis underwent laparotomy and infliction of a gunshot wound from a small caliber pistol in order to damage different lobes and segments of the liver in 26 dogs and to injure the spleen in 10 dogs. Surgical debridement of the wounds involved removal of necrotic parenchyma, excision of crushed sections and further inspection of the wound channel with stitching or clamping when necessary. The presence or absence of hemorrhage and bile effusion in the area of the operation and the coagulation time served as criteria of effectiveness of the procedure. No complications occurred in connection with use of the plasma flow. One month after surgery, the area was covered by a mature scar, covering unchanged hepatic parenchyma. Healing and scarring processes on the wound surface were the same, in the same periods, in the liver and spleen. Tissue healed with development of active proliferative processes with a slight leukocytic reaction at the interface of the coagulated and the intact tissues. Reparative processes proceeded in ordinary courses without pronounced inflammatory changes. The procedure was recommended for use in field surgery. References 8; Russian

### **Treatment of Purulent Diseases of Soft Tissues by CO<sub>2</sub> Laser and Immobilized Trypsin**

917C0333B Moscow KHIRURGIYA in Russian No 9,  
Sep 90 (manuscript received 6 Apr 89) pp 65-68

[Article by P. I. Tolstykh, G. D. Litvin, A. I. Dadashev and A. I. Titov; Scientific Research Institute of Laser Surgery (director - professor State Prize Laureate O. K. Skobelkin); Moscow]

UDC  
616.74-001.4-002.3-085.849.19-059:615.355:577.152.344

[Abstract] Patients (110) with purulent diseases of the soft tissues underwent treatment with the use of immobilized trypsin on gauze after CO<sub>2</sub> debridement of the purulent foci. Results were compared with results achieved after treatment of three control groups: 1 - 50 patients treated by use of different antiseptics after the CO<sub>2</sub> debridement, 2 - 35 persons in which surgical debridement of the purulent foci did not involve use of a laser and local treatment involved the use of trypsin on gauze and 3 - 50 persons treated by traditional methods. Patients suffered from abscesses (89 patients), phlegmons (65), acute purulent mastitis (32), carbuncles and furuncles (31) or suppurating atheromas, hematomas or cysts of the tail bone (28). Concomitant diseases existed in 120 patients: diabetes mellitus (38), ischemic heart disease (26), hypertension (30), malignant tumors (4) and other diseases (cholecystitis, bronchitis, osteochondrosis and others) (in 29 patients). Most patients (78.4 percent) were women ranging in age from 41 - 80 years. Use of immobilized trypsin for treatment of purulent wounds formed after surgical debridement with the use

of the laser produced the most favorable course of the wound process. It caused no neutrophilic infiltration, accelerated the rate of necrosis, produced earlier formation of and intense growth of granulation tissue and intensified reparative processes. It reduced the time required for preparation of the wound for secondary suturing. References 10: Russian.

### Use of Immozymase for Treatment of Suppurative Wounds

917C0333C Moscow *KHIRURGIYA* in Russian No 9, Sep 90 (manuscript received 17 May 89) pp 69-73

[Article by A. M. Gonchar, A. S. Kogan, A.V. Troitskiy et al.; Institute of Cytology and Genetics (director-V. K. Shumnyy; USSR Academy of Sciences; Siberian Section; Irkutsk Institute for the Advanced Training of Physicians; Department of Surgery)]

UDC 617-001.4-002.3-085.355:577.152.34]-036 8

[Abstract] Assessment of the effectiveness of use of immozymase for treatment of purulent wounds involved clinical studies of four groups of patients. Group 1 patients received a 10 percent solution of sodium chloride to treat their purulent wounds; group 2 received trypsin; group 3 received Profezum and group 4 patients received immozymase. The study included 1,059 patients with purulent-necrotic processes of different etiology in different locations. Diseases treated included: felons, abscesses, phlegmons, infected wounds, post-surgery purulent wounds, purulent mastitis; furuncles, carbuncles, suppurative epithelial coccygeal duct, paraproctitis and ulcers in chronic osteomyelitis. Use of immozymase produced 1.5 - 2 times quicker cleansing of the wounds than that produced by use of traditional methods. The immobilized proteinases produced a prolonged therapeutic effect and stimulated the regenerative process. Both Profezum and Immozymase proved to be useful in purulent wound surgery but use of Immozymase was preferable in intra-tissue prolonged proteolysis and in intracavitary therapy. References 10: Russian.

### Papain Phonophoresis in Treatment of Purulent Wounds and Inflammatory Processes

917C0333D Moscow *KHIRURGIYA* in Russian No 9, Sep 90 (manuscript received 17 May 89) pp 74-76

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UDC 617-001.4-002.3-085.355:577.152.34].015.2:615.837.3

[Abstract] A study of the effect of papain on the dynamics of reparation of purulent processes when combined with dimexide and introduced via phonophoresis

involved observation and treatment of 153 patients with different purulent diseases (including purulent wounds, abscesses and phlegmons in different locations, purulent mastitis, post-injection infiltrate and post-surgery infiltrate). The experimental group included 72 persons treated by papain phonophoresis and a control group treated by conventional methods. Control group members displayed pathological processes analogous to those found in the experimental group. After applying antiseptics (hydrogen peroxide, furacilin or others), a freshly-prepared ointment containing 1 g of papain, 20 g of dimethyl sulfoxide and 80 g of a vaseline-lanolin base was placed around the wound at a distance of 1-2 cm from the wound edges or directly on the surface of the inflammatory infiltrate. Analysis of the dynamics of healing of the purulent wounds showed: the mean course of cleansing purulent exudate from the wound surface after papain phonophoresis was 3.3 days; tissue granulation 4.6 days; completion of the wound process 12 - 17 days as compared to 7.8, 8.9, 20.6 days, respectively, after conventional treatment. Healing of wounds treated by papain phonophoresis occurred 1.8 times more quickly than healing of wounds treated by conventional methods. Pathogenic microflora in wounds treated by phonophoresis disappeared on the 7th day of treatment while they persisted to the 11th-12th day after treatment by conventional methods. References 15: Russian.

### Dynamics of Clinical and Morphological Changes in Burn Wound After Electrical Stimulation by Pulsed Current

917C0333E Moscow *KHIRURGIYA* in Russian No 9, Sep 90 (manuscript received 8 Jun 89) pp 77-81

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UDC 617-001.17-001.4-085.844-036.8-07

[Abstract] A study of the healing process of slow healing post-burn wounds after use of local electrical stimulation of the wound with use of current-carrying carbon tissue as an electrode involved 12 patients ranging in age from 18 - 62 years. The wounds included 3B degree burns on the 27th-65th day after injury. Electrical stimulation was applied 3 - 8 times in a 3 - 11 day period, depending upon the nature and size of the burn wound. Clinical data, confirmed by results of morphological and biochemical studies, confirmed the pronounced stimulating

effect of local electrical stimulation which facilitated successful attachment of skin autografts. The method was recommended for use in a complex of measures for local treatment of burn wounds. References 15: 13 Russian, 2 Western.

### Means of Antibiotic Treatment and Chemotherapy of Q Fever

917C0477A Moscow ANTIBIOTIKI I

KHIMIOTERAPIYA in Russian Vol 36 No 2, Feb 91  
pp 41-43

[Article by M. B. Maksimov, Scientific Research Institute of Epidemiology and Hygiene, Lvov; under the rubric "REVIEWS"]

UDC 616.98:579.881.13]-085.33-036.8

[Text] Burnet's coxiellae (*Coxiella burnetii*) are some of the most infective of agents [46]. The inspiration of one coxiella is sufficient for the infection of a human being [52]. Precisely for this reason Q fever is widespread in both the developing and in the highly-developed countries. In the FRG alone 3,400 cases were recorded in 20 years [29].

Chlortetracycline (biomycin), which exerts a static effect on Burnet's coxiellae, was one of the first means of treatment of Q fever. A therapeutic effect was observed in experiments; however, it decreased the intensity of immunogenesis and did not promote the cleansing of the organism of the agent in all cases [6]. The results of the use of this antibiotic in clinical practice have been characterized by an insignificant and fleeting effect [3, 5]. The more effective rickettsiostatic effect of tetracycline and other antibiotics of this series has been identified in further experimental investigations [7, 9, 40].

Satisfactory results with the treatment of acute cases of Q fever have been obtained in clinical practice using oral forms of preparations of the tetracycline series [2, 53], but these are more often employed in combinations with morphocycline [1], chloramphenicol (levomycetin) [32], erythromycin, as well as sulfamethoxazole, trimethoprim, or co-trimoxazole [21]. At the same time, the prescription of a daily dose of 25 mg/kg of tetracycline divided into four doses has been recommended [45] in patients over the age of eight. In cases of severe forms of Q fever or the absence of an effect in the first 2 - 3 days of treatment, as well as in chronic Q coxiellosis endocarditides, the parenteral administration of the antibiotic with the subsequent shift to the oral form has been recommended [10, 44]. However, treatment with tetracycline, even in different combinations with other antibiotics, has not been effective in all cases. A fatal outcome of acute Q fever in a child as the result of the development of progressive cirrhosis of the liver, notwithstanding treatment with tetracycline and chloramphenicol, has been described [17].

Many authors [4, 10, 12, 13] have noted the effectiveness of the combination of antibiotics of the tetracycline group with preparations of the pyrazolone series and corticosteroid hormones. However, the use of the latter should be cautious, since under certain conditions the corticosteroid hormones are pronounced immunosuppressors.

Doxycycline is the most frequently used of the preparations of the tetracycline series [21]; doxycycline is better absorbed and more slowly excreted from the organism. The observation that the treatment of a patient with Q fever first with erythromycin over the course of a week, followed by a combination of benzylpenicillin and gentamicin, and then by chloramphenicol did not yield a therapeutic effect, and that only the prescription of doxycycline led to a cure [35] may attest to the effectiveness of this preparation. Reports of other clinicians have been published concerning good results of the isolated use of doxycycline, as well as its combination with co-trimoxazole in acute and chronic cases of Q fever [24, 58]. The positive effect has been described of the treatment of Q coxiellosis endocarditis in a seven-year-old child with doxycycline, prescribed without combination with other antibiotics over the course of four weeks intravenously, and over the course of the following six months orally [15]. In a comparison of the results of the treatment of a 111 Q fever patients with tetracycline and doxycycline, preference was given to doxycycline [48]. However, other authors have reported [22] that a six-month treatment of Q coxiellosis endocarditis with doxycycline did not lead to a cure or normalization of the immunological indices.

Oxytetracycline (terramycin) also acts rickettsiostatically on Burnet's coxiellae. The introduction of the antibiotic into the culture medium at the same time as the cell culture is infected with coxiellae prevented the development of the infectious process; the addition of the preparation during the intracellular multiplication of the coxiellae resulted in the cessation of their accumulation, but multiplication continued after it was eliminated from the medium [8].

There have been few observations regarding the effectiveness in Q coxiellosis of isolated or combined use of aureomycin (chlortetracycline), morphocycline, and terramycin (oxytetracycline); nevertheless these preparations have been recommended [1, 6].

If the duration of the prescription of antibiotics for patients with the acute form of Q fever does not exceed one week following the termination of the febrile period, drug treatment is significantly prolonged in the chronic illnesses.

There is a large number of reports in the literature regarding Q coxiellosis endocarditides, which can develop even 20 years following the acute illness with Q fever, and not infrequently [60] lead to surgery on the heart. In these cases, in addition to the cardiac glycosides and the diuretics, primarily tetracycline or doxycycline

in combination with co-trimoxazole or trimethoprim are prescribed for a prolonged period of time [37, 43, 48], and this therapy, even over the course of two years does not always lead to a cure [30]. The duration of the use of antimicrobial preparations in the Q coxiellosis endocarditides is determined by clinical and immunological (a decrease in the titer of antibodies to phase I antigens lower than 1:200) indices [25, 48, 54], and is not less than 12 months on the average. However, frequent cases of achieving an effect only after a more prolonged, even 64-month period of treatment, have been described [54].

The rifampicins exerted a rickettsiostatic effect on Burnet's coxiellae in experiments which was as powerful as that of tetracycline [40, 49]. These antibiotics have received a positive appraisal in Czechoslovakia [33], where Q coxiellosis is the most widespread rickettsial infection. Rifampicin is widely used separately [34] or in combination for the treatment of both acute and chronic cases of Q fever [26, 39]. A case of Q coxiellosis encephalitis, similar to lethargic encephalitis, has been described [14]. Following the establishment of the etiology, tetracycline, cephalothin, and prednisolone were prescribed, as the result of which a new increase in the febrile reaction followed in the patient, possibly provoked by the immunosuppressive effect of the corticosteroid. And a gradual improvement began only after the prescription of rifampicin and chloramphenicol. However, there is still another report [51] according to which, following the establishment of the Q coxiellosis etiology of the endocarditis, the patient was treated sequentially with tetracycline and co-trimoxazole, which led to a ten-month remission. When a new exacerbation occurred, rifampicin, lincomycin, and co-trimoxazole were prescribed, but after four months, the patient died as the result of new flare-ups of the endocarditis. Some authors [34] considered rifampicin more active than tetracycline in relation to Burnet's coxiellae; others [46] express doubt regarding this, and prefer the combination of rifampicin with tetracycline or doxycycline. There are data available [13] indicating that the treatment of Q fever with rifampicin alone, as in the case of the combination of this preparation with doxycycline, or the isolated use of other rickettsiostatic antibiotics does not guarantee the prevention of relapses, and consequently, the chronicization of the process.

Chloramphenicol had a significantly weaker effect in experiments than tetracycline [40]. In addition, with prolonged use chloramphenicol suppresses the blood-forming function of the bone marrow [54]. Nevertheless, the use of this preparation has been recommended for the treatment of Q fever [14, 16]. There is a report available regarding the successful treatment using chloramphenicol of a disease which was interpreted to be Q fever, although the increase in antibodies in this patient to the spotted fever agent was higher than to Burnet's coxiellae [31]. The majority of clinicians have either not observed the effectiveness of treatment with chloramphenicol, or have reported that it is inferior to the effect

of preparations of the tetracycline series [5, 33]. Chloramphenicol is frequently used in combination with tetracycline.

Of the antibiotics of the macrolide group, the effect of erythromycin on the Burnet's coxiellae has been investigated in experiments [40]; the rickettsiostatic effect of this preparation proved to be weaker than that of preparations of the tetracycline group, or was completely absent [49]. Clinical evaluations of the treatment of Q fever with erythromycin are ambiguous. In addition to data on the lack of effectiveness [35] and data indicating [39] that a rapid cure was achieved in one patient with Q fever treated with a combination of erythromycin and streptomycin, while in three who had received only erythromycin, the progression of Q coxiellosis pneumonia continued, there are available reports regarding the high degree of effectiveness of the isolated use of this preparation [20, 23], and of the combination of it with co-trimoxazole [21, 47] or tetracycline [36].

Recommendations have been made in the case of the absence of a treatment effect with tetracycline concerning the intravenous or intramuscular administration of sigmamicin or tetracycline [10]. We were unable to find data regarding the effectiveness of treatment with lincomycin alone in the literature. This preparation has been used in combination with tetracycline [25, 54, 55, 57] in Q coxiellosis endocarditides; however the reports regarding the effectiveness of this combination have been contradictory. Thus, following a two month course of treatment of endocarditis in two children with tetracycline in combination with lincomycin, and with trimethoprim in combination with sulfamethoxazole, coxiellae continued to be excreted from their blood, and needle biopsies of lymph nodes and spleen [37]. According to other reports, a female patient was alive and well for four years and nine months (the observation period) following the termination of treatment as a result of a five year use of these preparations in a like illness [56]. This is the longest duration of life of all the outcomes of the treatment of such patients recorded up to 1978.

Analysis of the results of the use of sulfamylamids in Q coxiellosis without combination with antibiotics in outpatient conditions attested to a lack of effectiveness [10]. However, the sulfamylamids exert an inhibitory effect on folate metabolism, which plays a decisive role in the multiplication of microorganisms, including the rickettsiae. Preceding from this fact, many clinicians have successfully used the combination of tetracycline antibiotics and trimethoprim, sulfamethoxazole or co-trimoxazole [21, 26, 30, 43, 47] for the treatment of acute cases of Q fever and the Q coxiellosis endocarditides, although hemolytic phenomena and thrombopenias have been observed in a number of patients with such treatment as a result of a side effect of these preparations [42, 44]. A case of the positive effect of the action of co-trimoxazole in combination with tetracycline in chronic Q coxiellosis endocarditis following prolonged



ineffective treatment with tetracycline, cloxacillin, and gentamicin [50] is worthy of note.

There are a few reports regarding the use of other antibiotics and chemotherapeutic agents for the treatment of Q fever. The combination of tetracycline with cephalothin, glucocorticoid hormones, and analgesics [14] and the combination of vancomycin and gentamicin [27] have been used unsuccessfully in Q coxiellosis endocarditides.

Thus, the majority of antibiotics either do not exert an effect on Burnet's coxiellae, or have weak rickettsiostatic properties. The tetracyclines and rifampicin are the leading agents for the treatment of acute and chronic Q fever. None of these antibiotics guarantees against relapses or the chronicization of the illness, and are therefore prescribed in combination with other antibiotics, chemotherapeutic agents, and steroid hormones [13, 18, 53]. A number of clinical observations demonstrates that as a result, even of combined therapy, recurrences [12, 19] are observed in 4 - 16 percent of patients, and chronic Q coxiellosis endocarditides terminating lethally in 30 - 50 percent [38, 42]. Given the imperfection of therapy or treatment with antibiotics which do not exert a rickettsiostatic effect, which frequently takes place due to the difficulty of diagnosing Q fever, the chronicization of the process with severe complications is more frequently observed. A working group of the WHO [World Health Organization] on the rickettsioses [11] has observed that up until now therapy with the antibiotics has not yielded satisfactory results. In Great Britain alone [41], in a five year period 92 (11 percent) cases of Q coxiellosis endocarditis have been identified out of 839 cases. A case has been described of the isolation of Burnet's coxiellae from an aortic valve removed from a patient with endocarditis which had been treated over the course of four years prior to operation with a combination of tetracycline and lincomycin [36]. Other authors [59] have also isolated Burnet's coxiellae from heart tissue removed during surgery for chronic endocarditis. A strain of Burnet's coxiellae which is resistant to tetracycline has been obtained in laboratory conditions [18], which does not exclude the circulation of such strains in nature.

The lack of a guaranteed cure following Q fever as a result of the antibiotic treatment and chemotherapy employed is associated with the fact that the medicinal agents utilized exert only a rickettsiostatic, and not a rickettsiocidal effect. Further investigations in relation to the development of rickettsiocidal pharmaceutical agents for the effective therapy of Q fever are urgently needed. Along these lines the investigation of preparations from the quinolone group is promising. According to published data, ciprofloxacin and especially difloxacin reduced the number of Burnet's coxiellae in cell culture [61].

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**Nocardioides Simplex 3E Complete Dissociation and Dechlorination of 2,4,5-Trichlorophenoxyacetic Acid**

917C0256A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 314 No 4, Oct 90 (manuscript received 21 Feb 90) pp 981-983

[Article by L. A. Golovleva and R. N. Pertsova, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]

UDC 632.934.1

[Abstract] This paper presents the first description of *Nocardioides simplex* 3E, a microorganism which completely dissociates the toxic environmental pollutant 2,4,5-trichlorophenoxyacetic acid, and assimilates it as its sole source of carbon and energy. It was also shown to assimilate 2,4-D, 2M4X, and chlorobenzoates. It is gram-positive and has a morphological cycle of development typical of coryneform microorganisms. Physiologically and chemotaxonomically, it is most similar to *Arthrobacter simplex* and *Pimelobacter simplex*. It is also similar to *Pseudomonas cepacia* AC1100, but is more stable. Figures 2; references 7: 1 Russian, 6 Western.

**Investigation of the Effect of Various Biocides on the Activity of Phosphatases of *Aspergillus niger***

917C0502A Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 52 No 6, Nov-Dec 90 pp 69-73

[Article by V. F. Smirnov, A. N. Leonteva, E. A. Zakharova; Gorkiy State University]

UDC 582.282.123.4:620.193.82

[Text] Metalloorganic and quaternary ammonium compounds, when added to the culture medium, inhibited the growth of the mycelium of *A. niger*, and inhibited the activity of neutral and alkaline phosphatases. The quaternary aluminum compound, ethonium, and the organotin compound, tributyl tin oxide, exerted an inhibitory influence on the activity of acid phosphatase, which in the mycelium accounts for 54 percent, and in the culture fluid, 94 percent, of the total phosphatase activity. The remaining biocides induced lysis of intracellular membranes and the passage of phosphatases out of the lysosomes, as a result of which the activity of acid phosphatase increased. Nevertheless, when these compounds were introduced into an homogenate of the mycelium, they suppressed the activity of acid phosphatase. The same biocides inhibited extracellular acid phosphatase in the culture fluid.

Recommendations are given for the use of a number of substances as means of the protection of industrial materials from harmful biological agents.

The phosphatases play an important role in the metabolism of living organisms. By catalyzing the hydrolytic cleavage of phosphoric esters, they maintain the level of phosphate necessary for various biochemical processes, and possibly participate in its transport into the cell. There is information regarding the phosphatases of mycelial fungi in the literature [3, 4, 8]. The functions, structure, and localization of the enzymes, and the activity of various chemical reagents on the activity of the enzymes have been investigated by these authors. However, in our view, there are few data available on the inhibitors of phosphatase activity in the fungi and on the mechanisms of the inhibitory action. The increased interest in these problems is associated above all with the participation of the mycelial fungi in harmful biological effects on various industrial materials. It has been established [1, 2], in particular, that the phosphatases of the fungi participate in the biodestruction of some industrial materials (polystyrene, phenolic plastics, etc.). In this connection, the search for agents for the protection of these materials from harmful biological effects, i. e., fungicidal additives which exert an inhibitory effect on the phosphatases of the fungi, has become urgent.

The purpose of our investigations was the study of the effect of structurally diverse biocidal compounds on the activity of the phosphatases (acid, neutral, alkaline) of *Aspergillus niger*, one of the most active biodestructors of various industrial materials.

**Material and Methods.** The following compounds served as the biocides: metalloorganic compounds, merthiolate, tributyl tin oxide (TTO); chlororganic compounds, trilan, AK-chlor; as well as ammonium tetrafluoroborate (ATFB) and the quaternary ammonium compound ethonium. The concentrations of the biocides were selected experimentally; they ranged from  $0.75 \times 10^{-4}$  to  $3 \times 10^{-3}$  M.

The *A. niger* culture was grown by the deep-liquid culture method on a liquid Czapek Dox liquid medium on shakers at 150 rpm in Erlenmeyer flasks at a temperature of 28-30°C.

The experiment was carried out in two versions: 1) the biocides were introduced into the Czapek Dox culture medium on the third day of cultivation of the fungus (prolonged exposure); the duration of cultivation was seven days; 2) the biocides were introduced into an homogenate of the mycelium of the fungus (short-term exposure). In order to obtain the homogenate, the mycelium was broken down mechanically, by grinding in the cold with quartz sand; it was then passed through a caproic filter. The filtrate was used for the determination of the phosphatase activity. The colorimetric method based on the capacity of phosphomonoesterases to cleave to the ester bond in sodium phenolphthalein phosphate, was used for the quantitative determination of the activity of the phosphatases [5]. The activity of the phosphatases was determined in the mycelium and in the culture fluid.



**Results and Discussion.** Three forms of phosphatases were identified when the phosphatase activity was determined in the mycelium of the fungus *A. niger*. Acid,  $\text{pH}^{\text{opt}}$  4.5; neutral,  $\text{pH}^{\text{opt}}$  7.0; and alkaline,  $\text{pH}^{\text{opt}}$  10.0.

Acid and neutral phosphatases were found in the culture fluid (Table 1). Acid phosphatase predominated percentage wise in both cases.

**Table 1. The Ratio of Forms of Phosphatases in the Mycelium and Culture Fluid of the Fungus *A. niger* (in %)**

Material examined	Forms of Phosphatases		
	Acid	Neutral	Alkaline
Mycelium	54	44	2
Culture fluid	94	6	-

In the case of the prolonged exposure, all of the antiseptics inhibit the growth of the fungi, as the result of which the weight of the mycelium decreases sharply. The fungicides exert a strong inhibitory influence on the neutral phosphatases, and they all suppress the activity of the alkaline phosphatases to a significant degree. Only ethonium and

TTO exert a suppressive effect on the acid phosphatases (decrease in activity of 50-70 percent), as does AK-chlor at an elevated concentration. The biocides trilan, merthiolate, and ATFB did not inhibit the alkaline phosphatases even at high concentrations (Table 2).

**Table 2. The Influence of Fungicides on the Activity of Phosphatases of the Mycelium of *A. niger* (prolonged effect)**

Fungicide	Concentration of fungicide, M	Activity of Phosphatases					
		acid		neutral		alkaline	
		M Ph per 1 mg protein	%	M Ph per 1 mg protein	%	M Ph per 1 mg protein	%
Control	Without fungicide	95	100	77	100	4	100
Merthiolate	$1.5 \times 10^{-3}$	92	97	12	15	0.2	5
	$1.5 \times 10^{-4}$	143	151	25	32	0.2	5
AK-chlor	$1.5 \times 10^{-3}$	127	134	59	76	0	0
	$3.0 \times 10^{-3}$	42	44	7	9	0.2	5
ATFB	$1.5 \times 10^{-3}$	106	112	51	66	0	0
	$3.0 \times 10^{-3}$	105	110	33	43	0	0
Trilan	$2.0 \times 10^{-3}$	125	132	77	100	0.25	6
	$3.0 \times 10^{-3}$	107	113	45	58	0.56	14
Ethonium	$1.5 \times 10^{-4}$	42	44	46	60	0.2	54
	$1.5 \times 10^{-3}$	39	30	20	43	1.9	48
TTO	$1.5 \times 10^{-3}$	37	39	25	33	1.2	29

We had previously observed [6] that the fungicides trilan, merthiolate, and ATFB increased the passage of protein into the culture fluid. It was concluded on this basis that they increase the permeability of the membranes all the way to the point of their lysis. It is known that the acid phosphatases are mainly concentrated in the lysosomes, the cell wall, and the periplasmic space [10]. It can therefore be hypothesized that these fungicides above all induce lysis of the membranes. As a result of this an intense discharge of phosphatases from the lysosomes takes place, and small concentrations of fungicides are not capable of inhibiting these enzymes, which in fact is responsible for the increase in the activity of enzymes.

In order to test whether the influence of the fungicides can be reduced to their influence on membrane permeability, or, on the other hand, directly on the enzymes, we investigated the influence on the fungicides in short-term experiments (Table 3). Compartmentalization is disrupted in the homogenate due to the breakdown of the cellular structures, and in this case merthiolate suppresses the enzyme by 17 percent, whereas the inhibitory effect on the activity of acid phosphatase of ethonium is the same as it was in the case of the prolonged exposure. Thus, it can be hypothesized that the inhibitory effect of ethonium is associated with the direct effect of the fungicide on the enzyme, while merthiolate, trilan, and ATFB are capable of exerting an indirect influence on acid phosphatase as well through a change in membrane permeability.

Table 3. The Influence of Fungicides on the Activity of Acid Phosphatase of a Homogenate of *A. niger*

Fungicide	Concentration of fungicide, M	Activity of acid phosphatase	
		M per 1 mg of protein in 1 h	%
Control	Without fungicide	774	100
Merthiolate	$1.5 \times 10^{-3}$	642	83
Ethonium	$1.5 \times 10^{-3}$	225	29

We investigated the influence of the fungicides ethonium and merthiolate on the extracellular phosphatases of *A. niger* (Table 4). The fungicides employed suppressed acid and neutral phosphatases in approximately equal

degree. However the inhibitory effect of merthiolate was, in this instance, stronger than that of ethonium. These data also attest to a direct influence of these fungicides on the protein enzymes.

Table 4. The Influence of Fungicides on the Activity of Phosphatases in Culture Fluid of the Fungus *A. niger*

Fungicide	Concentration of fungicide, M	Activity of phosphatases					
		acid		neutral		alkali ne	
		M per 1 mg of protein in 1 h	%	M per 1 mg of protein in 1 h	%	M per 1 mg of protein in 1 h	%
Control	Without fungicide	125	100	8	100	0	0
Merthiolate	$1.5 \times 10^{-3}$	71	57	4.3	54	0	0
Ethonium	$1.5 \times 10^{-3}$	108	86	8.7	70	0	0

There is practically no information available relative to the mechanisms of action of the different inhibitors on the activity of fungal phosphatases. It is known that the acid phosphatases of the fungi are glycoproteins, and that their protein moiety consists of two or more polypeptide chains [7]. The alkaline phosphatase of the fungi is a metalloprotein, and contains the zinc ion. This indicates the possibility of the participation of sulfhydryl groups in the manifestation of the catalytic activity of the enzymes [9]. This may, to a certain degree, explain the inhibitory effect of the organomercury and organotin biocides, merthiolate and TTO, i. e., the mercury and tin ions probably block thiol groups. Possibly the inhibitory effect of ethonium (a surface-active substance) is manifested as a result of its influence on the enzyme-substrate complex.

The experimental data which we have obtained make it possible to recommend the metalloorganic biocides, merthiolate and TTO, as well as the quaternary ammonium compound ethonium as means of protection against harmful biological effects on industrial materials.

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**Effectiveness of Treatment of Purulent Wounds by Carbon Laser and Dressings With Enzymic Activity**

917C0233 Moscow VOYENNO-MEDITSINSKIY  
ZHURNAL in Russian No 10, Oct 90 p 35

[Article by P. I. Tolstykh, A. I. Efendiyev, A. I. Dadashev  
and A. I. Titov]

UDC 616.5-001.4-002.3-089:621.375.826-059:615.355

[Abstract] Observation of 230 patients with different purulent diseases of the soft tissues included 80 persons (group 1) having undergone surgical debridement of purulent foci by a CO<sub>2</sub> laser and use of trypsin immobilized on gauze and trypsin in combination with lysozyme for treatment of the forming wounds, 50 persons (group

2) having undergone similar debridement and use of antiseptics (chlorohexidinbigluconate, ektericide and iodopyron) and 100 persons in two groups (3 and 4) treated by the methods used above without the use of the laser. Mixed infections most frequently included staphylococcus, Bacillus coli, Proteus bacteria, streptococcus and other microorganisms. After traditional treatment of the wounds, the microbial level was  $10^5 - 10^8$  in 1 g of tissue in the first days after surgery. This level decreased slowly to  $10^3 - 10^6$  and was under the critical level from the ninth day after treatment. The use of immobilized proteases without laser treatment reduced the microbial count more than did the traditional treatment. The addition of the laser to the treatment produced a significant bactericidal effect, reducing the number of bacterial cells 100-1000 times more than was the case with use of debridement with a scalpel.

**Features of Antihypoxic Action of Mexidol  
Related to Its Specific Effects on Metabolism**

917C0273A Moscow

*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*  
in Russian Vol 24 No 8, Jul 90 (manuscript received  
25 Jul 89) pp 9-11

[Article by L. D. Lukyanova, V. Ye. Romanova, G. N. Chernobayeva, N. V. Lukinykh, L. D. Smirnov, Scientific Research Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow]

UDC 615.225.015.4:612.013.7].07

[Abstract] Mexidol (2-ethyl-6-methyl-3-oxypyridinium succinate, I) is a 3-oxypyridine derivative (3-OP). All 3-OP compounds have a broad spectrum psychotropic effect, apparently mediated by a GABA-benzodiazepine-Cl-ionophoric complex. A number of 3-OPs have also manifested antihypoxic activity, particularly in acute hypobaric hypoxia. This article studied the influence of compound I and a few other 3-OP derivatives on the respiratory chain in experiments on white male rats. Various bioenergetic parameters were evaluated using isolated liver mitochondria. Compound I is found to have definite advantages over other 3-OPs with antihypoxic properties. Its antihypoxic effect results from a mechanism not involving its direct interaction with the respiratory chain as an energy substrate, but rather as a function of its modifying influence on the receptor function of the membranes. Figures 2; references 11: 10 Russian, 1 Western.

**Mixed Compounds of Nickel (II) with Amino  
Acids and Ethylene Diamine and Their Antiviral  
Activity**

917C0273B Moscow

*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*  
in Russian Vol 24 No 8, Jul 90 (manuscript received  
14 Mar 89) pp 38-40

[Article by A. Ye. Shvelashvili, Ye. I. Boreko, G. V. Vladiko, L. V. Korobchenko, M. V. Karkarashvili, T. N. Sakvarelidze, I. A. Beshkenadze, Institute of Physical and Organic Chemistry, Georgian Academy of Sciences, Tbilisi; Belorussian Scientific Research Institute of Epidemiology and Microbiology, Belorussian Ministry of Health, Minsk]

UDC 615.281:578]:546.742].07

[Abstract] Continuing their systematic studies in the area of the chemistry of the coordination compounds of transition metals with ring-forming ligands, the authors undertook the synthesis of mixed compounds of nickel with amino acids and ethylene diamine. The synthesis was performed in two stages: production of compounds of the metals with amino acids, followed by exposure to ethylene diamine which probably extracted two water molecules from the internal coordination sphere and formed the complexes. The compound  $[\text{NiAsp} \times \text{Gly} \times \text{en}] \cdot \text{H}_2\text{O}$  manifested antiviral properties in experiments with classical avian pseudoplague virus. It was found that compounds containing amino acids and water molecules within the internal coordination sphere do not have the ability to inhibit the reproduction of viruses in tissue culture. Also, these compounds are toxic. The introduction of ethylene diamine to the molecule results in the appearance of the antiviral activity noted above. Figures 1; references 11: 9 Russian, 2 Western.

**Presynaptic Mechanisms of Intensification of Reactivity of Command Neurons of Defensive Behavior of Snail Against Background of Effect of Vasopressin Analog**

917C0326A Kiev NEYROFIZIOLOGIYA in Russian  
Vol 22 No 6, Nov-Dec 90 (manuscript received  
17 Jul 89) pp 723-730

[Article by I. V. Kudryashova; Institute of Higher Nervous Activity and Neurophysiology; USSR Academy of Sciences; Moscow]

UDC 612.822.3+612.014.46

[Abstract] A study of the effect of a vasopressin analog, desglycineargininvasopressin, on activity of two types of small neurons, situated around command neurons of defensive activity of snail involved experiments on a preparation of snail central nervous system. Analysis of the effect of the analog on the frequency of background action potentials, the amplitude of spontaneous excitatory post-synaptic potentials and their number in one minute and the reaction of neurons after stimulation of the intestinal nerve followed addition of  $10^{-6}$  mol/l of the analog to the perfusion medium. Perfusion of the peptide increased the overall excitatory post-synaptic potentials in command neurons after nerve stimulation due, probably, to the increase of probability of appearance of an action potential in presynaptic neurons of another type. It did not affect the monosynaptic connection between the primary sensory and the command neurons. Typical signs of these neurons included the presence of short-latent action potentials at the apex of excitatory post-synaptic potentials in reaction to stimulation and their increase against the background of the peptide. Existence of parallel pathways of excitation distribution from the periphery to the command neurons was assumed. Properties of similar pathways were described and neurons possessing corresponding properties were identified. Prolonged changes of spontaneous excitatory post-synaptic potentials caused by the vasopressin analog appeared in these very cells. Figures 5; references 23: 12 Russian, 11 Western.

**Cytophotometric Study of Monoamines and Energy Exchange Enzymes in Paravertebral Ganglia Neurons During Cold and Emotional Stress**

917C0326B Kiev NEYROFIZIOLOGIYA in Russian  
Vol 22 No 6, Nov-Dec 90 (manuscript received  
26 Jun 90) pp 771-779

[Article by V. I. Lapsha and V. N. Bocharova; Institute of Physiology, Belorussian SSR Academy of Sciences; Minsk]

UDC 616-003.725:612.822:611.839.31

[Abstract] A study of changes of the level of catecholamines and energy exchange enzymes in neurons of the

stellate ganglion and thoracic section of the sympathetic trunk ( $Th_6 - Th_{10}$ ) during brief cold and emotional stress employed histochemical methods and computer analysis in experiments on 47 male Wistar rats weighing 180-200 g. Placement of rats in a cold chamber with air temperature from  $-10$  to  $-20^\circ\text{C}$  for 4 - 5 hours produced cold stress. Immobilization of rats lying on their back for 4 - 5 hours produced emotional stress. Both cold stress and emotional stress intensified monoamines fluorescence and energy exchange enzymes activity in stellate ganglion neurons. Such changes appeared in the thoracic section of the sympathetic trunk only after development of hypothermia. The findings suggested the existence of selective activation of paravertebral ganglia neurons under different stresses. Figures 4; references 29: 16 Russian, 13 Western.

**Taurine-Activated Currents in Isolated Rat Cerebellum Neurons**

917C0326C Kiev NEYROFIZIOLOGIYA in Russian  
Vol 22 No 6, Nov-Dec 90 (manuscript received  
2 Feb 90) pp 780-786

[Article by A. Ye. Valeyev, O. A. Garashchuk and A. N. Dashkin; Institute of Physiology imeni A. A. Bogomolets; USSR Academy of Medical Sciences; Kiev]

UDC 577.352.5:612.822:612.827

[Abstract] A study of taurine-activated currents in isolated Purkinje neurons of 8- to 12-day-old rat cerebellum employed membrane fixation potential, intracellular perfusion and concentration jump. Application of taurine to the neuron membrane surface activated both chlorine and potassium conductivity of the membrane. The dose-effect curve for taurine-activated current of the isolated Purkinje cells had a S-shape with the dissociation constant of the receptor-mediator complex at  $2 \times 10^{-3}$  mol/l. No cross desensitization occurred between taurine and glycine but it appeared between taurine and gamma amino butyric acid. Blocking of the taurine-activated currents by bicucullin and strychnine differed qualitatively. Pentobarbital and nasepam potentiated taurine-activated currents. Figures 6; references 19: 1 Russian, 18 Western.

**Changes of Processes of Recycling Vesicles of Hippocampus Presynapses Under Conditions of Glutamate Neurotoxicity Modeling**

917C0326D Kiev NEYROFIZIOLOGIYA in Russian  
Vol 22 No 6, Nov-Dec 90 (manuscript received  
11 Apr 90) pp 819-826

[Article by G. G. Skibo, D. A. Rusakov and Ye. G. Smozhanik; Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences, Kiev; Dnepropetrovsk State University imeni 300th Anniversary of the Reunification of the Ukraine and Russia]

UDC 612.83:612.815+611.82+591.482

[Abstract] Sections (200-500  $\mu\text{m}$  wide, zone CA1) of month-old rats underwent morphometric electron microscopic study before use of glutamate and after an increase of extra-cellular concentration of glutamate up to 500  $\mu\text{mol/l}$  for 0.5 hour. Use of a statistical-stereological method showed the distribution of basic spatial parameters of the presynaptic terminals. There was a pronounced increase in the number of membrane caveoles associated with phases of vesicles recycling (up

to 13 per presynaptic terminal, on the average), an increase of the mean area of the axolemma and an insignificant change of volume of the presynaptic terminals. The data were considered from the point of view of corresponding changes in physico-chemical mechanisms of endocytosis and exocytosis. The possible role of the observed effects in processes of long-term potentiation of neurotoxicity and phenomena in it was discussed. Figures 6; references 30: 8 Russian, 22 Western.



# Attitude of Polyclinic Physicians Toward Mass Health Screening of the Population

917C0203A Moscow SOVETSKOYE

ZDRAVOOKHRANENIYE in Russian No 12, Dec 90  
(manuscript received 6 Jan 88) pp 14-17

[Article by candidates of medical sciences Ye. I. Kalchenko, V. I. Kiyanov and L. I. Krom, Department of Social Hygiene and Health Care Organization, Leningrad Institute for Advanced Training of Physicians]

UDC 616-084.3:008(47+57)

[Text] Some aspects of the attitudes of physicians toward mass health screening of the population and the level of their occupational preparedness for such work have been studied by a number of researchers. In particular, L. A. Zavyalova et al.<sup>2</sup> concluded that the success of mass health screening depends to a significant degree on the activity and conscientiousness of physicians, especially district and shop internists. G. Z. Demchenkova and M. L. Polonskiy<sup>1</sup> report that 12.6 percent of physicians do not feel that preventive examinations are necessary in

healthy individuals, and 7 percent do not feel they are necessary in essentially healthy persons; 58.8 percent of physicians stated that the population needed to be prepared more for its participation in medical measures and for a healthy lifestyle. According to A. S. Madakhanov's data<sup>3</sup>, only 38 percent of district physicians are helping to shape a positive attitude in the population toward health screening.

Our objective was to study the attitude of physicians working in polyclinics of a large city toward mass health screening of the population, as well as the level of their organizational and procedural training for that work. For that purpose, 556 physicians were surveyed with a specially prepared questionnaire. The physicians included 311 district internists, 151 treatment specialists (surgeons, neuropathologists, ophthalmologists, etc.), and 94 diagnostic specialists (laboratory technicians, X-ray specialists, etc.).

The survey established that only 63.7 percent of physicians are in favor of mass health screening of the population, while 12.2 percent relate to it negatively or indifferently (Table 1).

**Table 1. Attitude of Physicians Toward Mass Health Screening of the Population  
(in percentage of total number of physicians)**

Medical Positions	Positive	Negative	Indifferent	Undecided	Total
Internists					
Territorial districts	52.0	15.8	2.4	29.8	100.0
Shop districts	74.5	8.5	-	17.0	100.0
Treatment specialists	76.1	5.3	0.7	17.9	100.0
Diagnostic specialists	68.1	7.4	1.1	23.4	100.0
Average of all physicians	63.7	10.8	1.4	24.1	100.0

Supporters of mass health screening of the population are consistently greater in number among treatment specialists (76.1 percent,  $t = 2.7$ ), while those relating to it negatively are encountered primarily among district internists (15.8 percent,  $t = 2.3$ ). The latter finding is especially alarming, because district internists are supposed to play the leading role in mass health screening of the population; they represent 39.9 percent of the total number of physicians responsible for performing health screening of the population in urban polyclinics.<sup>1</sup> Also

disturbing is the considerable number of physicians (24.1 percent) who are undecided about their attitude toward mass health screening of the population, especially among district internists (29.8 percent).

Even when the attitude toward mass health screening of the population is positive, its success depends in many ways on the training of the physicians themselves. However, our research showed that far from all physicians feel themselves to be adequately trained (Table 2).

**Table 2. Self-Assessment of Physician Training in Relation to Organization and Methods of Mass Health Screening of the Population (in percentage of total number of physicians)**

Medical Positions	Excellent	Good	Fair	Poor	Total
Internists					
Territorial district	1.6	20.2	55.6	22.6	100.0
Shop district	-	33.9	59.3	6.8	100.0
Treatment specialists	2.0	46.3	37.7	14.0	100.0
Diagnostic specialists	-	32.9	53.2	13.9	100.0
Average of all physicians	1.2	30.9	50.8	17.1	100.0



As we can see from Table 2, only 32.1 percent of physicians feel fully trained for mass health screening of the population, 50.8 percent assessed their knowledge as fair, and 17.1 percent considered their knowledge poor. Treatment specialists were the most satisfied with their training (48.3 percent), while district internists were least satisfied (21.8 percent) ( $t = 5$ ).

We established that a physician's area of expertise in matters involving the transition to mass health screening of the population determines his attitude toward it to a

certain degree. In particular, among district internists, 30 percent of the supporters of mass health screening assess their training highly (both good and very good), while only 13 percent of those who relate negatively and indifferently to screening assess their training highly ( $t = 3.4$ ).

The generally poor training of physicians in terms of organizing and performing mass health screening of the population was the source of our interest in the means by which they had acquired knowledge pertaining to this problem (the respondents were able to indicate several sources of knowledge) (Table 3).

**Table 3. Means by Which Physicians Acquired Knowledge in Problems Associated With the Organization and Procedures of Mass Health Screening of the Population (in percentage of number of those surveyed)**

Medical Positions	VUZ	Residency	Specialization and Advanced Training Courses	Seminars, Conferences	Independent Study	Other	Nowhere
Internists							
Territorial district	30.1	7.5	36.1	67.5	27.4	6.3	4.8
Shop district	25.4	6.8	20.3	66.1	32.2	-	6.8
Treatment specialists	20.5	6.6	47.0	82.8	21.8	8.6	3.3
Diagnostic specialists	20.2	7.4	35.1	60.6	21.3	4.3	5.3
Average of all physicians	25.3	7.2	37.2	70.3	25.3	5.9	4.7

Most physicians (70.3 percent) feel that they received their principal training in matters concerning mass health screening of the population at seminars, 10-day training courses and conferences conducted at their places of work. Treatment specialists cited that source of information most often (82.8 percent), whereas diagnostic specialists cited it least often (60.6 percent) ( $t = 3.7$ ).

Specialization and advanced training courses are in second place as a source of information (37.2 percent). Specialists are especially satisfied by screening training provided in specialization and advanced training courses (47 percent), whereas shop internists are least satisfied by it (20.3 percent) ( $t = 3.9$ ).

Only one out of every four of those surveyed (25.3 percent) stated that he received his principal training in a medical institute. That was indicated primarily by district internists (30.1 percent). Only 7.2 percent of physicians named residency as a source of information.

One out of every four (25.3 percent) stated that the knowledge needed for mass health screening of the population was obtained through independent work with the literature. Such individuals were found mostly among shop (32.2 percent) and district (27.4 percent) internists. Especially disturbing is the fact that 4.7 percent of physicians have never undergone any training in matters concerned with health screening; most of them are found among shop internists (6.8 percent) and diagnostic specialists (5.3 percent).

Materials with procedural instructions help raise the competency of physicians in matters concerning mass health screening. Most of the surveyed physicians (71.9 percent) are familiar with the procedural instructions, but 28.1 percent are unaware of them. Our research data showed that shop internists (81.3 percent) and treatment specialists (73.5 percent) are the most informed in this regard, while diagnostic specialists (68.1 percent) and district internists (70.2 percent) are informed to a considerably lesser degree.

It was reliably established ( $X^2_{11.8} > X^2_{table} = 11.34$ ;  $p = 0.01$ ) that knowledge of procedural instructions helps develop a positive attitude in physicians toward health screening of the population. Among those acquainted with the instructions, 57 percent approve of mass health screening of the population; among those who are unfamiliar with them, 40 percent approve. The first group contains half as many physicians who are undecided in their attitude toward screening (26 percent and 46.7 percent, respectively). It was also established that physicians familiar with the procedural instructions are better at performing health screening. For example, only 5.5 percent of district internists who assessed their knowledge of health screening as "good" or "very good" are unfamiliar with the instructions, while 32 percent and 47.4 percent, respectively, of those who assess their knowledge as "fair" or "poor" are unfamiliar with them ( $X^2 = 23.6 > X^2_{table} = 11.3$ ;  $p = 0.01$ ).

Data on the effect that the volume of work done in the polyclinic to initiate mass health screening has on the attitude and level of preparedness of physicians with regard to screening are of interest.

Among the district internists we studied, who are to play the main role in health screening, 86.5 percent work in institutions that have already initiated mass health screening of the population. In those institutions, 54 percent of the physicians approve of health screening. Physicians who approve are considerably fewer—only 38 percent—in institutions that have not yet begun implementing the program ( $t = 1.8$ ). The first group contains almost half as many physicians (29.3 percent and 50 percent, respectively) who are indifferent or undecided about the work ( $t = 2.3$ ). Physicians actively involved in health screening are aware of the procedural approaches reliably more often (74 percent as compared with 44 percent;  $t = 3.3$ ); they are better prepared, and they assess their knowledge more frequently as "very good" or "good" (respectively, 22.9 percent and 14.9 percent) and less often as "poor" (respectively, 19.3 percent and 51.7 percent). Differences in the preparedness of both groups are statistically reliable ( $X^2 = 16.1 > X^2_{table} = 9.2$ ;  $p = 0.01$ ). Physicians in institutions of the first group have a clear idea about the work ahead seven times more frequently (respectively, 35 percent as opposed to 4.8 percent). In institutions of the second group, which are not carrying out mass health screening of the population, physicians who have no idea of how to perform the screening are encountered seven times more frequently (respectively, 3.7 percent and 61.9 percent;  $X^2 = 44.2 > X^2_{table} = 9.2$ ;  $p = 0.01$ ).

The surveyed physicians were also asked to speculate on the reasons their attitude toward present and future health screening of the population was not optimistic. When grouped and generalized (as percentages of all who had stated their opinion on this account on the questionnaire), their statements appeared as follows: insufficient staffing of polyclinics, especially with regard to nurses and specialized physicians (29 percent); unsatisfactory availability of equipment, including computers (19.7 percent); heavy workload in terms of seeing patients, plus excessive paperwork (19.7 percent); lack of efficiency in organizing health screening (16.9 percent); passiveness or a negative attitude of the population toward health screening (15.3 percent); perfunctory screening and its ineffectiveness (13.7 percent); unavailability of prompt, high-quality laboratory testing of patients (11.5 percent).

District internists were more likely than others to cite excessive workload in terms of seeing patients (25 percent), perfunctory screening and its consequent ineffectiveness (18 percent), and the limited possibilities of subdepartments that perform laboratory-diagnostic tests (15 percent).

Our research permits a number of conclusions and recommendations.

1. Polyclinics possess great unutilized possibilities for upgrading the quality of health screening and for increasing the number of persons under dispensary observation.

2. More than a third of polyclinic physicians (36.3 percent) do not feel mass health screening of the population to be realistic.

3. The main reasons that physicians do not have faith in the success of health screening are that the physicians feel inadequately trained, polyclinics are understaffed but overworked in terms of treatment work, subdepartments responsible for laboratory diagnostics are not in a position to perform the work properly, there are flaws in the way mass health screening is set up and the screening is performed perfunctorily, and the population does not have a positive psychological attitude toward health screening.

4. Short-term seminar-conferences and independent study are the predominant means by which 75.6 percent of physicians obtain the knowledge they need for mass health screening, which indicates that the training process in medical institutes, in residency and in institutes for the advanced training of physicians is geared to treatment rather than prevention.

5. Even after all of the personnel and material-and-technical problems are solved, successful transition to mass health screening of the population will depend not only on such factors as introducing forms and methods of scientific organization of labor into practice, reducing treatment work, and freeing physicians of excessive paperwork, but also on, primarily, the extent to which the entire system of training and advanced training for physicians—not to mention for the health care agencies and institutions themselves—is geared to this immense and important work.

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### Prevention of Premature Aging

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[Text] Doctors, biologists, geneticists, gerontologists and other specialists are waging a major offensive on old age and on what would seem to be its unavoidable consequence—premature death. The broad spectrum of pharmaceuticals, the creation of biological prostheses, the possibilities of homotransplantation of organs and systems and, with the development of cloning techniques for growing autotransplants and the development of multiple autotransplantation, the combination of cloning techniques for growing tissues and genetic engineering, which imparts prescribed characteristics to transplants—all will make it possible in the future to postpone death or to avoid severe disability in many cases.

Extending the life span is a complex task, one which will promote further progress of mankind. The successes of science, on one hand, and the reduction of the birth rate in certain areas, on the other, are resulting in a build-up of elderly and very old persons in the population structure. This age group is defined today not simply by the

number of years lived, but also by health and vital activity. In addition to the physiological processes that lead to aging of the body, the body is also affected by human diseases; moreover, a close interrelationship exists between the number of diseases, their severity, and the aging of the body.<sup>1,6</sup> This is confirmed by the number of chronic diseases that increases with age (so-called "accumulated pathology"—AP). It should be noted in this case that the frequency of office visits is not a reflection of the real incidence of chronic diseases, and that only comprehensive medical examinations of the population permits correct determination of this indicator.

The frequency of chronic diseases and states identified by comprehensive medical examinations (per 1,000 population of a given age group) increases with age. Our further treatment of these data (Table 1) showed that the increment in AP over a period of 65 years of life (from age 15 - 80) is 4.8 illnesses per 1,000 residents on an annual average, with the largest increment in AP noted at ages 50-59—that is, prior to the onset of the elderly period.

Table 1. AP Increment in Age Groups (Per 1,000 Residents in Each Age Group)

Indicator	Under 15	15-19	20-29	30-39	40-49	50-59	60-69	70-79
AP*	982	1010	1342	1679	1945	2636	3565	4072
Absolute increment of AP in the age group		28	332	337	266	691	929	507
Mean annual increment of AP, %		0.6	3.3	3.4	2.7	6.9	9.3	5.1
Mean annual increment of AP in adult population, %		An increment of 3,100 illnesses in 65 years, or 4.8 per year						

\*Data of G. A. Novgorodtsev et al.<sup>3</sup>

Obviously, the health of the elderly and prevention of premature aging are things that need to be addressed prior to the onset of the elderly period. Regular medical examinations occupy a natural place within the complex of measures directed at slowing or changing the aging process. Kurtzman and Gordon<sup>2</sup> cite the data of American insurance companies and the U.S. National Center for Public Health Statistics, which persuasively demonstrate the role of annual medical examinations in improving the population's health and lengthening life expectancy.

Unfortunately, medicine is currently preoccupied primarily with sick people rather than with healthy people, despite constant assurances that Soviet health care is geared to prevention.

Annual mass health screening of the population was conducted vigorously in Latvia for four years (from 1984 to 1987). Its purpose was to identify diseases in their

early stages and then intensively treat the individuals identified with the diseases. The screening was performed with a comprehensive automated medical examination system developed in the republic (the KASMON).<sup>4,5</sup>

The fact that, each year, 75 - 85 percent of the adult population was screened enabled the detection of as many as one-third of all illnesses, including those recorded for the first time, through preventive examination; moreover, the majority of those illnesses were caught in their early stages, when the subjects still considered themselves to be essentially healthy. Over that [four-year] period, the contingent of dispensary patients increased by almost 31 percent, and the morbidity rate for circulatory and respiratory diseases increased by 60 percent and 45 percent, respectively. The number of cancer cases detected by preventive examination doubled (to 14 percent from 7), and the

proportion of cancer classified in clinical group IV declined from 19.2 percent to 16 percent.

There was an increase in the quantity of planned surgical interventions for repair of hernias (by 17 percent), for adenomectomies (11 percent), and for treating vascular diseases (40 percent), mammary diseases (15 percent) and ear diseases (12 percent). The quantity of strangulated hernias decreased by 12 percent.

Table 2 compares the results of a selective study in Riga of 2,900 residents in 1984 and 2,500 residents of the same age group in 1987. A substantial decline (by 30.2 percent) is noted both for the total AP and for illnesses identified for the first time (by 22.6 percent) as a result of the detection of diseases in their early stages and the intensive treatment of them, to include surgery. This is especially so with regard to diseases requiring gynecological, otorhinolaryngological, surgical or urological care.

**Table 2. Comparison of AP (Including Pathology Detected for the First Time) in Riga in the First and Fourth Years of Mass Health Screening (Per 1,000 Residents)**

Pathology Profile	Total Illnesses Detected		Decline in Chronic Illnesses, %	Including Those Detected for First Time		Decline of Illnesses Revealed for First Time, %
	1984	1987		1984	1987	
Internal medicine	830.0	567.1	31.7	78.3	40.6	48.1
Surgical and urological	360.0	192.8	37.0	70.5	23.1	67.2
Neurological	368.3	264.0	28.3	19.6	10.9	44.4
Otorhinolaryngological	220.1	65.1	62.2	20.2	2.0	-90.0
Ophthalmological	426.1	341.7	19.8	14.1	13.0	7.8
Gynecological	108.6	37.0	65.9	33.9	8.9	73.7
Total	2396.3	1673.1	30.2	240.2	186.0	22.6

Mass health screening made it possible to compare AP (including pathology detected for the first time) in age

groups under 60 and 60 or older (Table 3). AP was studied in relationship to 16 pathology profiles detected by the KASMON system.

**Table 3. Comparative Data on AP in Age Groups 15-59 and 60 or Older in 1987 (Per 1,000 Residents of Each Group)**

Pathology Profile	Total AP		AP Revealed for First Time	
	15-59	60 or Older	15-59	60 or Older
Psychiatric	107.0	54.5	25.6	1.7
Nephrological	5.3	17.5	0.5	3.5
Urological	18.5	93.0	1.0	8.7
Endocrinological	66.2	93.0	42.0	59.6
Rheumatological	48.0	25.4	2.1	1.7
Pulmonological	73.9	210.5	4.7	5.2
Ophthalmological	257.0	623.0	10.6	21.5
Gastroenterological	106.0	131.6	19.0	0
Oncological	26.0	28.1	18.9	3.5
Neurological	228.0	401.7	13.8	1.7
Cardiological	191.0	710.5	11.1	7.0
Drug-abuse	31.7	10.5	22.2	8.7
Surgical	102.0	308.0	21.1	8.7
Dermatological	11.4	15.8	1.6	0
Otorhinolaryngological	31.8	175.0	1.0	5.2
Gynecological	42.4	19.2	9.5	7.0
Total	1585.0	2350.0	206.0	135.0

Note. Sample consists of 2,458 residents of Riga; 1,888 aged 15-59 (77.4%) and 570 aged 60 or older (22.6%).

We distinguished three groups of pathology profiles that manifested themselves differently in different age groups. The first group of illnesses, in which AP (including pathology detected for the first time) prevails in the under 60 age group, includes illnesses of psychiatric, rheumatological, gynecological and drug-abuse profiles.

The predominance of those pathology profiles in individuals under 60 (Table 4) may be explained, to a large extent, by the fact that individuals with psychological or drug-abuse pathology either die prior to reaching 60 or, when they become elderly, enter specialized hospitals and do not undergo clinical examinations in polyclinics.

**Table 4. Forms of Pathology in Which AP (Including Pathology Detected for First Time) Prevails in Individuals Under 60**

Pathology Profile	Total Illnesses Detected Per 1,000 Persons at Ages of		Preponderance of AP	AP Detected for First Time		Preponderance of AP
	Under 60	60 Years or Older		Under 60	60 Years or Older	
Psychiatric	107.0	54.5	2-fold	25.6	1.7	15-fold
Drug-abuse	31.7	10.5	3-fold	22.2	8.7	2.5-fold
Rheumatological	48.0	25.4	1.8-fold	2.1	1.7	1.2-fold
Gynecological	42.9	19.2	2.2-fold	9.5	7.0	1.3-fold

Gynecological diseases, which occur more often in younger age groups, are treated within that same age group and cease to play a dominant role in old age.

Rheumatic diseases also afflict young people primarily. Owing to age-related changes in the body's response, elderly and very old people rarely suffer rheumatism.<sup>6</sup> Our data confirmed that point, and the decrease in AP in persons over 60 is explained by postoperative death in connection with surgery for heart disease and by death due to complications of chronic rheumatic diseases or due to accompanying diseases.

The second group was made up of forms of pathology in which AP (including pathology detected for the first time) prevails in individuals over 60 (diseases of the eyes, lungs, endocrine system, urogenital system, and ear, nose and throat organs), which provides the grounds for considering them predominantly diseases of elderly and very old individuals (Table 5). In our view, prevention and treatment of those diseases, which arise and accumulate predominantly among elderly persons, should be the job of geriatric physicians and of the appropriate types of specialists who have received geriatric training.

**Table 5. Forms of Pathology in Which AP (Including Pathology Detected for First Time) Prevails in Individuals 60 or Older**

Pathology Profile	Total Illnesses Detected Per 1,000 Persons at Ages of		Preponderance of AP	AP Detected for First Time		Preponderance of AP
	Under 60	60 or Older		Under 60	60 or Older	
Nephrological	5.3	17.5	3.3-fold	0.5	3.5	7-fold
Urological	18.5	93.0	5-fold	1.0	8.7	8.7-fold
Endocrinological	66.2	93.0	1.4-fold	42.0	59.6	1.4-fold
Ophthalmological	257.0	623.0	2.4-fold	10.6	21.5	2-fold
Otorhinolaryngological	31.8	175.0	5.5-fold	1.0	5.2	5.2-fold
Pulmonological	73.9	210.5	2.8-fold	4.7	5.2	1.1-fold

The third group included forms of pathology in which diseases accumulate in elderly age, although the diseases are revealed primarily at younger ages (Table 6). Such are diseases of cardiological, neurological, gastroenterological, surgical and dermatological profiles. On the one hand, those diseases may also be considered pathology of elderly

individuals; on the other hand, the greater frequency of their detection in individuals under 60 and their undisputed influence upon health and, consequently, rate of physiological aging require that they be detected and treated at earlier stages of their appearance.



**Table 6. Form of Pathology Detected Predominantly for the First Time in Individuals Under 60 and Accumulating in Old Age**

Pathology Profile	Total Illnesses Detected Per 1,000 Persons at Ages of		Preponderance of AP	AP Detected for First Time		Preponderance of AP
	Under 60	Over 60		Under 60	60 or Older	
Cardiological	191.0	710.3	3.7-fold	11.1	7.0	1.7-fold
Gastroenterological	106.0	131.6	1.2-fold	19.0	0	19-fold
Surgical	102.0	308.0	3-fold	21.1	8.7	2.4-fold
Neurological	228.0	401.7	1.8-fold	13.8	1.7	8.1-fold
Dermatological	11.4	15.8	1.4-fold	1.6	0	1.6-fold
Oncological	26.0	28.1	1.1-fold	18.9	3.5	5.4-fold

The relationship established between aging and diseases is important not only theoretically but also practically, inasmuch as it provides an opportunity for seeking specific and timely means of preventing and treating the diseases.

Our broad-scale, four-year experience in mass health screening of the population permits the conclusion that annual screening that begins in childhood and is followed by intensive treatment of pathologies can, in combination with other health improvement factors, play a substantial role in preventing premature aging and preserving the health of elderly and very old persons.

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#### Operation of a City 'Brak i Semya' [Marriage and Family] Counseling Center

917C0203C Moscow SOVETSKOYE

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(manuscript received 27 Mar 90) pp 44-46

[Article by V. Ya. Pigarev, S. A. Narzykulova, Ye. A. Volynskaya and G. M. Mukhitdinova, City Brak i Semya

[Marriage and Family] Counseling Center at the Central City Children's Consultative-Diagnostic Polyclinic, Tashkent]

UDC 613.88+613.89:364.444(575.1-25)

[Text] A specialized 'Brak i Semya' [Marriage and Family] service was first set up in Tashkent in 1982 at a maternity hospital by reorganizing the city specialized gynecological dispensary and the city office of medical genetics.

The counseling center became part of the Central City Children's Consultative-Diagnostic Polyclinic in 1983. This structure permits specialists of the children's center to maintain direct observation of children born as a result of stimulated ovulation and spermatogenesis.

The main goals and objectives of the city Brak i Semya center is to provide consultation and treatment to the population in matters concerning impaired reproductive and sexual functions, hereditary pathology, family and marriage relationships, family planning and birth control and to provide health education.

The novelty of this medical care and the unique features of this particular region were taken into consideration when the staffing and structure of the counseling center were formulated. Specialized procedures were carried out by gynecologist-endocrinologists, an andrologist, a sex-pathologist, a neuropathologist, a psychologist and a gynecologist who had undergone special training in genetics. The service was furnished with a colpocytological, an andrological and a medical genetics laboratory. Treatment was provided centrally in the counseling center by increasing the volume of work done by the treatment, injection and physiotherapeutic offices and the minor surgery room.

The flow of patients and the reference-and-information service were also managed centrally.

This report analyzes five years of operation of the counseling center (see table).



Principal Operation Indicators of the Counseling Center for 1982-1986

Indicator	1982	1983	1984	1985	1986
Number of patients registered	3,145	3,037	4,376	5,637	5,185
Number of clinical laboratory analyses carried out	10,411	13,010	13,085	15,199	16,856
Number of procedures performed	23,115	26,150	46,827	32,912	31,167
Percentage of pregnancies		12.3	15.2	14.5	16.1

Patients were examined in stages in order to determine more precisely the nature and level of affliction of different elements of the reproductive system. In the first stage, the patients were examined at the primary polyclinic level, where chronic specific infections were ruled out (syphilis, brucellosis, toxoplasmosis) and extragenital pathology and genital infections were identified.

The second stage included a visit to a particular specialist. In cases involving a childless marriage, the presence of both spouses was mandatory, so that the principles of treatment and testing could be clarified and so that the interpersonal relationships in the family and the psychological mood could be evaluated. After that, an individual guidance plan was drawn up for the married couple in each specific case.

A thorough examination, specialized on the basis of indications, was initiated in the third stage. This examination included functional diagnostic tests, hormonal functional tests, hysterosalpingography, hysteroscopy, ultrasonic echography, EKG and EEG, craniography, radioimmunoassay of plasma hormones, determination of steroid hormone metabolites in urine, verification of agents of genital infection coupled with determination of antibioticograms, etc.

Since we didn't have our own state-of-the-art material-and-technical base for most of the analyses, we signed practical agreements with the UzNIIDIV [not further identified], an affiliate of the VNTsKh [not further identified] of the USSR Academy of Medical Sciences, the endocrinology department of the Tashkent State Medical Institute, and the Republic Clinical and Diagnostic Center. This made it possible to run better tests and to sharply reduce the amount of time patients had to devote to testing. Specialists (neuropathologists, oculists, neurosurgeons, etc.) of treatment-and-prevention facilities and scientific research centers of the city were extensively recruited in this stage to confirm or exclude accompanying extragenital pathology.

Finally, in the concluding stage, hospital examination methods were employed as necessary (diagnostic scraping of the uterus, with verification of its condition, endometry, biopsy of testes, laparoscopy, etc.).

This approach consistently improved the results of topical diagnosis, which generally facilitated an increase in

the percentage of pregnancies from 12.3 percent in 1983 to 16.1 percent in 1986 (see table).

Testing and treatment of spouses by a gynecologist working jointly with a urologist was a mandatory condition of treatment. This pertained primarily to groups of patients with sexually transmittable genital infections (approximately 65-70 percent of the patients). Recovery was monitored bacteriologically on an ongoing basis, against the backdrop of strict adherence to requirements involving the use of mechanical contraceptives. After a complete cure of infection was effected, methods of stimulating ovulation and spermatogenesis were employed simultaneously, which doubled the effectiveness of treatment, reduced considerably the time of treatment of each spouse, and almost completely curtailed a torpid course of inflammation.

The operation is being improved by regularly held joint seminar-conferences of gynecologists working in women's counseling centers and urologists working in polyclinics, as well as the chief specialists of the health care administration for problems involving the improvement of care to persons with family and marriage problems. Contact with interested practicing physicians made it possible to develop a unified approach to treating married couples, and to strengthen ties between the primary urban polyclinic unit and the specialized family counseling service.

We still do not have a special, standardized form of reporting for services of this specialty. The analysis of the operation was conducted on the basis of a quantitative assessment—by totalling the number of visits, analyzing patients by disease category, and so on.

A reporting principle based on expert assessment of the work of the individual physician was used in 1986 to identify additional ways to improve the work of counseling centers. Qualitative criteria based on the end result not only identified the levels of professionalism of given specialists, but also established the need for reexamining staff size and composition. For example, the percentage of fulfillment of work obligations, on the average per staff, is 68 percent for gynecologists, 104 percent for urologists, 150 percent for sexologists and 94 percent for medical geneticists.

Experience has demonstrated the advisability of placing a lawyer and a sociologist on staff. Moreover, the service needs staff nurses of general profile to support the work of the urologists, the sex-pathologists, and the psychotherapist.

New forms of work with the family require that we reserve a certain number of beds to support morphological tests used to identify pathology of the endometrium and testes, to analyze jointly with cytogeneticists scrapings of biopsy sites from the endometrium, to verify early abortions and the frequency and nature of chromosomal aberrations, and so on.

It would be advisable for the executive committees of the city's labor councils and health care agencies to adopt a decision obligating wedding centers and rayon marriage registry offices to register marriages only upon presentation of the conclusions of specialists of the Brak i Semya counseling center stating that the future couple had undergone premarital consultation. This would make it possible to identify risk groups for pathology of reproductive function (especially in regard to blood marriages, which is especially important to our region) and thereby promote meaningful treatment-and-prevention work with young families.

Strict monitoring and reporting by medical facilities of all patients in need of specialized care from the Brak i Semya service is needed, with mandatory referral of those patients to the city counseling center, since there have been frequent cases of prolonged inadequate hormone therapy in unspecialized counseling centers.

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### **Regional Features of Planning Specialized Hospital Care for the Population in the Conditions of Restructuring of Public Health**

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UDC 614.211+65.012.2(478)

[Text] Abstract: The results of research on optimum planning of the development and location of hospitals in the Moldovan SSR in the period to the year 2000 are presented.

Data from a comprehensive study of the population's morbidity and of its demand for hospital care, a prediction of demographic indicators, data on the current state of hospital care to the population at different levels, and

other data are employed. The research objectives were attained by means of statistical, architectural design, expert assessment and sociological methods, as well as on the basis of stage-by-stage planning based on a differentiated approach to specific standards.

Seven bibliographic references, 2 tables.

Special sociological studies of public opinion in the Moldovan SSR on the degree of satisfaction of the demand for hospital care at different hierarchical levels revealed that 73.1 percent of the respondents are displeased with the organization of the work of, and treatment provided by, section hospitals [5], while 19.4 percent are dissatisfied with treatment provided in central rayon hospitals [3].

Hospital care was planned and developed at all hierarchical levels without regard for regional, economic and demographic features, for the health of the population and for other medical organizational and urban design factors. This led to unjustified concentration of narrowly specialized care and decentralization of general hospital care. By the early 1980s, narrowly specialized hospital care was concentrated primarily in the capital, while the bulk of beds intended for general care were dispersed locally, down as far as rural section hospitals (RSH's). Development of RSH's, which now possess more than 18 percent of the republic's bed pool, had been justified previously as a means of bringing hospital care closer to the rural population. However, numerous studies conducted in the republic [4,5] demonstrated the inappropriateness of RSH's to our region, both from the medical and the economic points of view. Proposals were made to gradually phase them out and subsequently concentrate and specialize the bed pools of the rayons in CRH's [central rayon hospitals] by creating departments in nine specialties in them (therapy, surgery, pediatrics, obstetrics and gynecology, neurology, infectious diseases, ophthalmology, otorhinolaryngology and dermatovenerology), with capacities of 30 beds in ophthalmology to 160 beds in therapy for a rural rayon of average population size. A decision was made to create interrayon specialized departments with a capacity of 60 beds or more in relation to some specialties to provide services to residents of several rayons.

Organizing hospital care in relation to all other specialties at the republic level in multiprofile hospitals, dispensaries and scientific research institutions was proposed.

The results of our special research made it possible to formulate, for the first time, a unified approach to distributing the bed pool among hospitals at the rayon level and in large cities.

Besides the standard, architectural design, statistical and other methods, the mathematical-economic method (linear programming) was used to locate rayon, inter-rayon and republic institutions. This method makes it possible to determine not only the place to locate a therapeutic institution and its capacity, but also the

principal parameters of economic outlays on construction and operation. It also permits establishment of medical service zones (their minimum, maximum and mean-weighted radii).

The goal of proposals for sensible distribution of hospital institutions was to concentrate and specialize the bed pool in CRH's and optimally decentralize narrowly specialized hospital care at the interrayon level in stages, prior to the year 2000 [5]. These proposals were approved by the collegium of the Moldovan SSR Ministry of Health (4 April 1980), and they were used as the basis for the long-range plan for development of public health in the republic.

However, very little was done to implement these proposals. Of 219 section hospitals in existence as of the end of 1980, 35 RSH's possessing a total of 230 beds have been eliminated thus far. At the same time, the capacity of CRH's increased by an average of 106 beds, to attain 454 beds by the end of 1988. Consequently, growth of the capacity of CRH's occurred primarily without concentration of the rayon bed pool. Moreover the inter-rayon stage of specialized hospital care has not yet been established in accordance with the long-range proposals.

In this time of restructuring of public health, the radical economic reform currently underway requires that we raise the effectiveness with which allocated resources are utilized. In this aspect, a three-year experiment in organizing the work of a day hospital at Polyclinic No 12 (Kishinev) was carried out, the results of which were summarized in methodological recommendations we published specially [1].

Day hospitals have the purpose of providing conditions for better and more effective use of the expensive bed pool of hospital institutions, shortening waiting lists for hospital treatment, and so on.

Our experience in experimental creation of a day hospital is now being introduced at operating rural outpatient clinics of a new type and at large multiprofile polyclinics in a number of the republic's rayons and cities.

The results of special research on the quality of hospital care for the population at the rayon and republic levels, which included expert assessments of 17,000 disease histories, showed that 7 percent of patients hospitalized in central rayon hospitals and 25.8 percent in republic hospitals were there without justification. The results of expert examination permitted us to substantiate a standard list of nosological units for each profile of specialties, and to define the stages of examination, hospital treatment and rehabilitation of patients, with regard for their health and the severity of disease [2]. In our opinion this list will make it easier for physicians in polyclinics and rural outpatient clinics to select patients for hospitalization with adequate grounds, it will improve continuity between therapeutic institutions, and ultimately it may serve as a basis for establishing the cost of treatment in hospitals of different types in

relation to different nosological disease groups. This is especially important in this time of transition to sector cost accounting.

The stage of restructuring that has begun in public health requires study of the health of the population and transition to regional standards that account for the peculiarities of the region's socioeconomic development, the demographic makeup of the population and the nature of population distribution in light of the new conception of organizing medical services to the population [6,7].

Considering all of this, in order to define the standard demand for hospital care by the population of the Moldovan SSR—a region with a high population density, we made a selective morbidity study based on patient visit figures and information from comprehensive medical examinations—a method recommended by the All-Union Scientific Research Institute of Social Hygiene and Public Health Organization.

In determining the need of patients for hospitalization by the expert assessment method, we took account of the fact that the process of therapy and diagnosis will intensify in the future, that a transition will be made to new forms of outpatient hospital services for the population, that the indications for outpatient and polyclinic care will be expanded, and so on.

Calculations carried out to determine the standards for hospital care showed that the demand of the population in the region for active hospital beds is 132.15 beds per 10,000 residents, including 136.42 for adults and 111.6 for children (Table 1).

**Table 1. Differentiated Standards for the Population's Demand for Hospital Care**  
(Number of beds per 10,000 population)

Profile	Total Bed Standard	Including	
		For Adults	For Children
Therapy	23.26	32.04	-
Pediatrics	8.40	-	30.62
Surgery	18.1	21.19	9.63
Obstetrics	9.09	12.4	-
Gynecology	7.27	9.78	0.36
Phthisiology	8.05	9.92	2.92
Infectious diseases	15.64	5.8	42.68
Neurology	7.25	9.23	1.82
Otorhinolaryngology	4.23	1.8	10.9
Ophthalmology	2.93	3.4	1.64
Dermatovenereology	4.2	4.37	3.75
Oncology	2.52	3.25	0.51

**Table 1. Differentiated Standards for the Population's Demand for Hospital Care**  
(Number of beds per 10,000 population) (Continued)

Profile	Total Bed Standard	Including	
		For Adults	For Children
Psychiatry	14.88	17.47	7.77
Narcology	4.23	5.77	-
Urgent care	2.1	-	-
Total	132.15	136.42	112.6

The standard we arrived at reflects the real need of the population for active hospital beds in our region, and it corresponds to the long-range tendency for the republic's bed pool to decrease (by 5.5 percent).

The standard we developed (132.15 beds per 10,000 residents) coincides in terms of the overall bed level with that currently recommended for our republic by the USSR Ministry of Health (132.1 beds); however, significant structural differences do exist. In particular, the standard demand for beds in pediatrics, gynecology, ophthalmology, neurology and infectious diseases, especially for children, is higher than that recommended by the USSR Ministry of Health, and it is lower in regard to therapy, surgery, obstetrics, otorhinolaryngology, physiology, psychiatry, dermatovenerology and oncology.

Differences in the structure of the standard demand for beds are noted not only in general but also in relation to specialties within particular therapeutic and surgical profiles, and in regard to the adult and juvenile population. The reason for this lies in regional features of the nature of pathology and of the need of the republic's population for hospitalization.

Thus the demand we substantiated for hospital care accounts more specifically for the peculiarities of the structure of pathology and for the age distribution of the region's inhabitants.

Considering local conditions as they are today (rural rayons high in population and low in territory, high population density, closeness of population centers, a good road network linking them together, and so on), it appears justified to concentrate and specialize the bed pool of rural rayons in CRH's, and to optimally decentralize narrowly specialized hospital care, with regard for the stages of hospital care we have developed (rayon or city, interrayon, and republic).

The standard demand for beds required by different specialties was divided among the different stages of hospital care, beginning with the rayon (city) level and beyond, with the goal of bringing specialized hospital care closer to the population.

The bed standard was divided into different stages on the basis of the principle of creating hospital departments with a capacity of not less than 50-60 beds; for a

number of narrow profiles (ophthalmology, dermatovenerology, traumatology etc.) the target was within 30-40 beds.

As a result we determined not only the total or overall bed standard for different stages, but we also established the level of specialization and the capacity of the corresponding departments in relation to each specific stage.

In the future, hospital care will be provided to the population at the rayon (city) level in the following specialties: therapy together with cardiology and gastroenterology, surgery together with traumatology, pediatrics, obstetrics and gynecology, infectious diseases, neurology, otorhinolaryngology, ophthalmology, and dermatovenerology. The total standard will be 86.96 beds per 10,000 population.

The total bed standard at this stage of medical care includes the 6.2 beds per 10,000 population recommended by the USSR Ministry of Health for our republic for organizing institutions providing medical care to the aged and disabled, and other forms of hospital services to this population category.

The interrayon level of hospital care is represented by specialties of a therapeutic profile in endocrinology, rheumatology, pediatrics, premature infants, and child nephrology; by specialties of a surgical profile—in orthopedics, neurosurgery (neurotraumatology) and urology; and by interrayon institutions providing phthisiological and narcological services, for a total of 16.95 beds per 10,000 population.

Narrowly specialized hospital care in all other specialties, as well as in profiles represented at the rayon and interrayon levels by complex cases of diagnosis and treatment, will be rendered in republic hospitals and dispensaries and in specialized scientific research institute centers and clinics at a volume of 34.44 beds per 10,000 total population (Table 2).

**Table 2. Standard Demand for Hospital Care of the Moldovan SSR Population at Different Stages of Its Organization**

Indicator	Stages of Organization of Hospital Care			Total
	Rayon, City	Interrayon	Republic	
Number of beds per 10,000 population	86.96*	16.95	34.44	138.35
Percent of total	62.7	12.3	25.0	100.0

\*Including 6.2 beds per 10,000 population foreseen for organizing subdivisions for medical care to the disabled, solitary, aged etc.

The projected capacities of central rayon, city, interrayon and republic hospitals, their distribution and their long-range development to the year 2005 were determined on the basis of the standard demand for beds



differentiated with respect to different stages of hospital care, the current status of the material and technical base of hospitals, a demographic prediction of population size and distribution, the basic directions of development of the republic's national economic sectors, the tendencies for development of the hospital service, and regional possibilities for providing hospitals with personnel, capital investments etc.

These long-range proposals were coordinated with and approved by the Moldovan SSR Ministry of Health, by rayon and city public health directors, and by the directors of republic medical institutions.

According to this plan, in order to attain the projected capacity of the hospitals and improve their material and technical base, 53.9 percent of the beds will be placed in newly erected hospital buildings, 31.1 percent will be placed in old remodeled buildings, and only 15 percent of the beds will remain in previously erected standard structures. Interrayon hospitals will become the binding link between the rayon (city) and republic stages of hospital care.

Implementation of this program will ensure intensification of the process of therapy and diagnosis, sensible use of the bed pool and reinforcement of ties among all public health services, and it will make it possible to upgrade the quality and increase the availability of hospital care to the region's entire population.

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#### Hygienic Aspects of the Current Diet of the Rural Population of the Moldovan SSR

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[Article by Ye. N. Popov, N. I. Opopol, Yu. N. Varava, M. Ye. Vlasov, A. V. Kotorcha, I. G. Lupu, K. F. Tiginyanu and M. S. Frunze, Moldovan Scientific Research Institute of Preventive and Clinical Medicine of the Moldovan SSR Ministry of Health, and the epidemiological stations of Brichanskiy, Kalarashskiy, Kotovskiy, Yalovenskiy, Orgeyevskiy and Slobodzeyiskiy rayons]

UDC 614.1(-022)

[Text] Abstract: The current diet of 511-690 persons living in 124-162 families in rural areas in two seasons of the year, and the diets of the members of these families at work and of children and adolescents in schools and children's preschool institutions, were studied.

Significant deviations from scientifically substantiated recommendations were established: a high level of consumption of bread products and insufficient consumption of meat, fish and milk and products made from them, eggs, vegetables, fruits and berries. While the overall content of proteins, fats and some trace elements and vitamins is adequate, the diet does not always satisfy the demand for animal fats, calcium and vitamins A, B<sub>2</sub> and C. The diet is not balanced in relation to some nutrients and mineral elements. The established shortcomings may have an effect on the physical development and health of the population.

Sixteen bibliographic references, 3 tables.

As we know, nutrition is a means of supporting life, growth and development, and of maintaining the health and high performance of the individual. The body's immunological reactivity, physical and mental activity, labor productivity and life span depend in many ways on nutritional status.

Insufficient or excessive nutrition are risk factors responsible for impairment of vital activities. Over 99 percent of the risk created by the unfavorable action of food is associated in this case with imbalances in the makeup of food rations [16]. Various metabolic changes



are brought about just by a nutritional regimen that is inadequate to the conditions [2,5,7,9,15]. Incomplete nutrition also puts metabolic processes off balance, often becoming the cause of development of disease in different organs and systems [4,8].

Numerous studies in different regions of the country with different types of agricultural production and differing in climatic, geographic, economic, geochemical and other conditions have been conducted in order to obtain information on the current nutritional status of individual population groups and to improve the diet [1,6,10]. It was established that the food rations of the rural population are too high in calories. Consumption of fats of animal origin is observed to be elevated, while consumption of vegetable fats as well as of animal proteins and a number of vitamins is inadequate.

The current nutritional status of different population groups has also been studied in the Moldovan SSR [3,12,13], but the information is somewhat outdated, and it cannot be used as a basis for developing diet improvement measures today.

In addition a clear tendency toward complication of the ecological situation can be noted in the republic. Under these conditions the human body experiences higher demands upon its adaptive capabilities. Under these conditions an inadequate or an imbalanced diet can become a factor aggravating the influence of harmful production factors, as well as of the high load imposed on man by chemical contaminants. There is scientific and considerable practical interest in studying the current nutritional status from this point of view.

#### Materials and Methods

The current diet was studied by means of questionnaires in the population centers of six rural rayons. Methodological recommendations on studying the current nutritional status and health of a population in connection with the nature of its diet were laid at the basis of the work [11]. Foods consumed by family members away from home (in children's preschool institutions, schools, field camps etc.) were added to foods consumed in the family diet. The survey was conducted over a period of 14 days in each season of the year in 124-162 families, containing from 511-690 persons depending on season. Nutrition information was entered on specially developed cards, and the data were systematized and statistically treated in accordance with commonly accepted methods [14]. The concentration of the principal nutrients and the calorie count of the rations were compared with the requirements we came up with for this specific population group.

#### Results and Discussion

We established that all of the basic food groups are represented in the diet of the republic's rural population. The greatest diversity of foods in the families is noted in the summer-fall season, when up to 50 different foods are included in the ration; in the winter-spring season the

food assortment is somewhat narrower—around 40 foods. At the same time the list of foods consumed daily, drawn up separately for each family, varies from 7 to 28 foods depending on the season of the year.

The rural population continues to consume a relatively large quantity of bread and bread products (pasta, flour, groats etc.). This level of consumption has persisted over the last two decades. The recommended consumption of this food group is significantly below actual consumption for the Moldovan rural population (Table 1). One other peculiarity should be mentioned. Over this period, a significant decrease occurred in consumption of legumes, a major source of protein.

**Table 1. Consumption of the Basic Food Groups by the Rural Population (gm/day, per capita)**

Food	Summer-Fall Season	Winter-Spring Season	Consumption of Basic Foods in 1967-1968	Recommended Consumption Amounts*
Bread and bread products	488.1	572.5	505.7	339.7
Potatoes	129.4	218.9	306.5	211.0
Vegetables and melons	232.4	135.7	219.2	430.1
Fresh fruits and berries	50.6	23.7	113.0	254.8
Dried fruits	0.3	0.2	1.1	16.4
Sugar	33.2	40.8	20.7	95.9
Vegetable oil	18.5	21.6	23.2	38.1
Meat and meat products	104.6	120.7	112.0	202.8
Fish and fish products	20.7	30.3	40.5	44.9
Milk and dairy products	228.3	218.8	617.2	876.7
Eggs	18.3	22.3	15.7	32.8

\*Recommended regional consumption amounts for the basic foods, on the average per capita in the year 2000, arrived at by the USSR Academy of Medical Sciences Nutrition Institute.

Potatoes are another food in the daily diet of the rural population, although their consumption decreased recently, approximately to the recommended level.

The level of consumption of vegetables and melons is low. According to the recommendations it should be approximately twice higher, especially in the winter-spring time interval. Consumption of fruits and berries recently declined. This may be explained by the fact that the population does not include foods of this group in the

“substantial” category; instead, they are included as a rule predominantly in the food ration of children. Consumption of sugar for specifically dietary purposes increased by a factor of 1.5 - 2, although it still remains below the recommended level. As far as vegetable oil is concerned, its consumption was low. And so it remains today.

Meat, fish, milk and products made from them are the most valuable part of the food ration, being sources of essential amino acids, some vitamins and minerals. Considering current recommendations, the rural population's demand for meat and fish products is being satisfied by a little more than half, while its demand for dairy products is being satisfied by only a fourth. Despite a certain increase in consumption of eggs (by 13 percent), their proportion in the food ration still remains low.

Study of the distribution of dishes and foods within each family shows that in general, the diet of children and adolescents includes more complete foods than does the adult diet. Their ration is more broadly represented by milk and meat products, fruits and berries. The reason for this lies to a certain extent in the fact that children eat not only in the family but also in children's preschool institutions and schools.

Thus certain changes having to do primarily with a decrease in consumption of a number of biologically valuable food groups occurred in the diet of the republic's rural population in the last two decades. As a result the food ration includes fewer products of animal origin, and consequently fewer complete proteins, polyunsaturated fatty acids, and some fat-soluble vitamins, trace and macroelements.

The sizable physical loads associated with most agricultural work and foot travel create a relatively high energy demand in the population (Table 2). Our research showed that the daily calorie content of the food rations fully compensates for the population's energy outlays, while in the winter-spring period it even surpasses them (Table 3).

Table 2. Average Daily Consumption of the Basic Foods and the Calorie Content of the Food Rations of the Adult Working Population

Calorie Content, Chemical Composition of Food Rations	Men	Women
Calorie content, kcal	3053	2569
Proteins, gm		
Total	91.4	77.5
Animal	50.3	42.7
Fats, gm	111.9	94.0
Carbohydrates, gm	419.7	354.1
Mineral elements, gm		
Calcium	800	800
Magnesium	400	400
Phosphorus	1200	1200
Iron	10	18
Vitamins, mg		
A, µg	1000	1000
B1	1.9	1.6
B2	2.2	1.8
PP	19.9	16.8
C	76.5	64.3

Table 3. Current Content of Basic Foods and Calorie Content of Food Rations of the Adult Working Population, M +/- m

Calorie Content, Chemical Composition of Food Rations	Summer- Fall Season		Winter-Spring Season	
	Men	Women	Men	Women
Calorie count, kcal	3166.2 +/- 53.8	2912.5 +/- 51.5	3580.3 +/- 69.3	3292.6 +/- 50.1
Proteins, gm, total	99.6 +/- 1.9	92.1 +/- 1.8	115.6 +/- 2.4	93.0 +/- 1.9
Animal	33.5 +/- 1.1	31.4 +/- 1.1	38.6 +/- 1.3	36.8 +/- 1.2
Fats, gm, total	123.1 +/- 2.9	114.0 +/- 2.8	135.0 +/- 3.9	111.2 +/- 3.9
Animal	88.9 +/- 2.5	84.0 +/- 2.5	96.7 +/- 3.3	87.9 +/- 4.1
Carbohydrates, gm	436.5 +/- 9.1	405.0 +/- 7.8	500.7 +/- 10.1	451.7 +/- 8.5
Mineral elements, gm				
Calcium	678.1 +/- 25.5	633.3 +/- 24.3	755.5 +/- 18.8	685.3 +/- 18.0
Magnesium	517.3 +/- 15.5	528.01 +/- 15.1	500.0 +/- 14.1	449.1 +/- 12.2
Phosphorus	1535.0 +/- 31.9	1417.9 +/- 32.2	1724.9 +/- 35.9	1566.0 +/- 30.6
Iron	25.0 +/- 0.5	22.7 +/- 0.4	25.8 +/- 0.6	23.4 +/- 0.5

**Table 3. Current Content of Basic Foods and Calorie Content of Food Rations of the Adult Working Population, M +/- m (Continued)**

Calorie Content, Chemical Composition of Food Rations	Summer- Fall Season		Winter-Spring Season	
	Men	Women	Men	Women
Vitamins, mg				
β-carotene	2.7 +/- 0.1	2.5 +/- 0.1	2.5 +/- 0.1	2.2 +/- 0.09
A, μg	270 +/- 10	240 +/- 10	300 +/- 20	300 +/- 20
B <sub>1</sub>	2.2 +/- 0.04	2.0 +/- 0.04	2.6 +/- 0.06	2.2 +/- 0.05
B <sub>2</sub>	1.5 +/- 0.03	1.4 +/- 0.06	1.7 +/- 0.05	1.6 +/- 0.04
PP	16.9 +/- 0.4	15.7 +/- 0.3	20.1 +/- 0.4	18.1 +/- 0.3
C	63.8 +/- 3.9	52.9 +/- 3.9	48.0 +/- 3.0	43.1 +/- 3.1

The amount of calories obtained from foods of animal origin is below recommendation. It is 26 - 31.5 percent of the daily calorie count, instead of one-third. The bread group, which provides up to 50 percent of daily calories, is the main energy source. Second in energy value are meat and meat products—20.2 percent, and dairy products are third, providing 11.8 percent of daily calories. Potatoes, vegetable oil and sugar are also significant in this respect.

Total protein content also satisfies physiological need. At the same time a deficiency can be noted in the content of animal proteins in food rations. Their content in the winter-spring season is 31.3 - 35.5 percent, which is below recommendation (55 percent of total proteins). Proteins provide from 200 to 462.4 kcal depending on season (11.3 - 13.6 percent of the daily calorie count of the food rations). The principal sources of protein in the diet are bread and bread products (up to 50 percent of the total amount), meat products (17 percent), dairy products (13 percent), eggs (2.6 percent) etc.

The total quantity of fats in the food rations of both seasons is somewhat above physiological need. At the same time the vegetable fat content of food rations is insufficient, and it does not cover demand. Fats provide from 573.3 to 1,215 kcal, or 30.4 - 36.4 percent of the daily calorie content of food rations, as compared to the recommended 30 percent. Fats of animal origin are obtained chiefly with pork and meat products (46 percent of the daily amount of fats), and 22.8 percent are obtained with dairy products. Fish and eggs make up a small proportion of the sources of animal fats. Vegetable fats are obtained almost completely from sunflower oil (17.4 percent of the total daily amount).

The current content of carbohydrates in food rations is significantly above physiological need. In spring-winter, carbohydrates are included in a diet in much larger quantities than during the rest of the year (the difference is statistically significant,  $P < 0.001$ ). On the whole, from 915.2 to 2,002.8 kcal, or 54.1 - 62.6 percent of the daily calorie content of food rations, come from carbohydrates. This is close or equal to the recommended proportion in the food ration. The cereal group (bread,

pasta, groats), which provides up to 73 percent of carbohydrates, is the principal source of carbohydrates in the diet.

The quantitative ratio between proteins, fats and carbohydrates is 1:1.2:4.4, irrespective of time of year. In terms of energy value this ratio is 1:2.8:4.4 in the summer-fall season and 1:2.6:4.5 in the winter-spring season.

Of interest is the fact that while the overall content of trace elements such as magnesium, phosphorus and iron in the food rations is sufficient, the calcium content is low. Its deficiency is 5.6 - 20.8 percent in the food rations of adults and 45.8 - 67.7 percent in the food rations of children and adolescents. The most frequently encountered ratios between the quantities of calcium and magnesium in the food ration are from 1:0.6 to 1:0.0 (as compared to the recommended 1:0.6), and between calcium and phosphorus it is from 1:2 to 1:2.4 (as compared to the recommended 1:1.5 - 1:2).

The concentration of the vitamin component in the food ration is of considerable interest. The amount of vitamin A does not reach the recommended level in any of the cases. This deficiency is compensated to some degree by carotene taken with vegetables. A certain deficiency is also noted in relation to vitamins B<sub>2</sub> and PP. When cooking losses are taken into account, the vitamin C content does not meet the demand. Its deficiency is more pronounced in the winter-spring season.

Our data show that significant deviations from scientifically grounded recommendations exist in the current diet of the rural population of the Moldovan SSR. The level of consumption of foods that are predominantly carbohydrate sources (bread, flour, pasta etc.) is high, while the proportion of a number of biologically valuable foods (meat, fish, milk and products made from them, eggs, etc.) is low. Inadequate consumption of vegetables, fruits and berries is also noted.

The structure and level of consumption of the basic food groups reflects upon the chemical composition of food rations and their physiological value. While the total

calories consumed are adequate and the total content of proteins, fats and some trace elements and vitamins is sufficient, in a number of cases the diet of the rural population does not cover physiological demand for vegetable fats, calcium and vitamins A, B<sub>2</sub> and C. The content of a number of nutrients and mineral elements is not balanced. The shortcomings we established in the diet of the rural population can in general affect some indicators of physical development and health.

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#### Moscow Physicians Association Plans Activities

917C0352A Moscow VECHERNAYA MOSKVA  
in Russian 13 Dec 90 p 2

[Interview with A. Sviridov, rheumatologist and president of the Moscow Physicians Association, by V. Kucherenko, place and date not given, under the "Perestroyka: Quality of Medicine" rubric: "On the Threshold of Change"; first paragraph is VECHERNAYA MOSKVA introduction]

[Text] To protect the rights of physicians from administrative arbitrariness and to protect patients from incompetent medical doctors—these are the goals the new social-professional organization, the Moscow Physicians Association, have set for themselves. We shall add that the new leadership of the Main Medical Administration of Moscow sees a constructive partner in the association in the transition to difficult market demands.

[Sviridov] "The necessity for it arose long ago. The domination of bureaucratized medicine has made the Soviet physician completely without rights as a professional. He has to treat a patient according to orders, instructions, and standards issued from above and within the framework of funds allocated for medicine. If in the past a physician was a representative of a free profession and was completely responsible for the health of the patient, he now is a controlled worker who has to be busy with a mass of report scribbles. Sometimes he does not have the right to write sick-leave certificates. A Soviet paradox has originated: a physician treats, but a faceless public health care system is responsible for this. And the system then, depriving a medical doctor of professional rights and independence, tears away everything new and progressive. As the result, a scandalous indifference and irresponsibility of representatives of the "most humane" profession burgeon into incompetence and dullness, and patients are ruined by physicians.

"However, the law of physician responsibility will be approved quickly, we hope. But it is not ruled out that medical doctors completely subject to the bureaucratic apparatus will find themselves in a position of unprotected "little men" who will be blamed for everything. And on the other hand, society is converting to market relationships, and this in combination with the old public health system threatens physicians with unemployment. A real danger exists that with duties established per hour of income, specialists even though knowledgeable, but not possessing connections, will be let go. Does one need to say what this will cost the patients?



"Therefore, we decided to form a union of Moscow physicians. The MAV will be the institution for social protection of the medical doctor—indeed, we are planning to organize our own medical institutions independent of the government. Only professionals who have passed a public examination will be accepted in it. Then a competitor to the old system will appear under new conditions. And if companies appear which deal with medical insurance, the patient will have a choice as to whether he prefers an MAV medical institution or a government hospital.

"Well, in order to maintain a professional level at a high grade, the MAV is thinking of organizing an information bank, a medical library, and a club where every member of the association will be able to be informed about the latest achievements of Soviet and world medicine."

[Kucherenko] "However, the MAV intends to protect the rights of patients also. In what way?"

[Sviridov] "I think above all a high level of professionalism of the physician and his freedom from bureaucratic surveillance will protect the patient most of all. Indeed, the medical doctor will be responsible for the patient according to law before all society and before his association colleagues. This will become real humanization of medicine.

"The MAV is also preparing to participate as expert witnesses—ecological and consumer—in the investigation of the danger of food products and high demand goods produced by enterprises and cooperatives; and to participate in the analysis of the activity of medical charlatans who have appeared and in the analysis of popular medical remedies. In the future, the MAV will be able to take the part of independent experts in judicial processes involving medical matters."

[Kucherenko] "The tasks which you pose require a solid financial basis. How do you intend to establish it?"

[Kucherenko] "I hope that we shall be able to start working on means. I have in mind membership dues and income from expert testimony and from medical, publishing, and instructional activity. Of course, we are counting on sponsors. Obviously, a far-sighted leader and far-sighted employers who understand the vital importance of establishing humane medicine will be found. "Our bank account number is 2700603 at the Krasnopressiyskiy department of the ZhSB [expansion not given]. We shall be glad for every business proposal, and it is possible to make proposals by calling telephone number 268-15-15 between 2 and 4 p.m.

### **Totskoye Nuclear Tests Lacked Medical Monitoring, Precautions**

917C0355 Moscow *RABOCHAYA TRIBUNA* in Russian, 22 Feb 91, p 4

[Article by A. Khotkevich, engineer-colonel, retired, under the "Without the 'Secret' Stamp" rubric: "An

Atomic Explosion Over the Samara"; first two paragraphs are *RABOCHAYA TRIBUNA* introduction]

[Text] There are those garrisons which not only military people are familiar with. Almost everyone has heard their names. One of them is the Totskoye military camps. They were named after the village of Totskoye, located on the upper reaches of the Samara River. The story is that it was founded as a Cossack outpost close by the post road connecting the center of Russia with Orenburg. In the second half of the last century, a military column including General Mikhail Dmitriyevich Skobelev, hero of the liberation of Bulgaria, made preparations here for the Khiva campaign.

The Totskoye camps are also remembered for World War II. Polish army units of General Anders were quartered here. Later, the First Czechoslovakian Corps was raised, one of the battalions of which Ludvik Svoboda, future president of the country, commanded. But in there is a special page, the "biography" of these camps. It was forbidden to talk about it for a long time.

Intensive building took place here in the spring of 1954. Echelons with servicemen and equipment began to increase. Later personnel arrived with animals. They placed camels, sheep, horses, and dogs in pens on the steppe. Several villages were resettled.

Immediately after breakfast, "armed" with spades, axes, and picks, companies and battalions set up positions with engineering equipment. Western and southern defense lines were plotted in red and blue on topographic maps. Each defense line consisted of several positions, and each position had two or three full-configuration trenches connected by communication trenches. They arranged shelters and dugouts for stationing of personnel, wood- earth firing points, trenches for tanks, ordnance, trucks, armored personnel carriers, and other weapons and military equipment. People were lost in conjectures about what these exercises were and when they would take place.

Only in the middle of the summer was it announced that the troops would participate in the first exercises in our country actually using an atomic weapon. They recommended, meaning ordered, us up to the end of the exercise to cease correspondence. The order not to divulge the substance of the exercise was issued in a list containing the names of each participant. Gas masks with protective heliofilters, individual antichemical and bandage packs, and protective clothing, gloves, and shoes were issued to everyone.

On 14 September 1954 by nine o'clock in the morning those invited took their places at the command tower. Among them were also the leaders of the people's democratic countries, as they were known at that time. Announcements were followed about readiness for the exercise. An airplane scout flew by in the clear morning sky. The airplane carrier appeared immediately behind it.



At 10:35 the observers of the exercise saw the rise of a new "sun" through dark glasses, and a strong air wave shock was felt in a few seconds. An enormous mushroom rose up in the sky.

Those present in the shelters heard a deafening detonation as if, blasting the pile, a gigantic hammer had struck a blow. The earth shook, and sand poured in from the chinks. Telephone wires were torn by the explosion. Air was electrified and did not conduct radio waves. From this moment the exercise went without a command, according to the previously planned scenario.

The troops, advancing in columns, moved forward. Detachments armed with engineering equipment cleared obstructions and extinguished conflagrations. Destruction increased in proportion to nearness to the epicenter.

Only furrows in the earth were reminiscent of the existence of trenches passing 500 meters from the epicenter. The walls of the trenches and communication passages came down, burying the animals located there. The shelters and dugouts were destroyed, and the equipment was scorched and overturned. A tank located 300 meters from the epicenter overturned. The whole area at a radius of 500-600 meters from the epicenter was bare parched earth.

A column of light trucks with those present at the exercises followed behind the troops directly toward the epicenter. They were shown the epicenter and the destruction produced by the explosion. Scientists headed by Academician Kurchatov gave explanations.

In autumn, units abandoned the exercise region. One tank regiment, which was commanded by Colonel Sapiy, an artillery regiment, and a military hospital remained in the town. "Peace workdays" were begun for these units. Two-story homes of the signal office centers were reequipped under the barracks, and the officers and reenlisted men were authorized to be quartered in small prefabricated panel houses. Families began to increase. A post exchange, a school, and a house-manager's office were opened. Life began to return to normal. At that time we still were not very much afraid of the atom and did not know its insidiousness.

When the first snow came, they began to hunt for rabbits, wood grouse, and hazel grouse in the region of the explosion. Elk meat appeared in the post exchange. Licenses were issued for shooting elk. But it appeared

that the elk themselves were seeking help from man. They came out to the hunter. One blind elk lived near the epicenter, and they fattened him with hay, bread crusts, and rusks.

In summer the aspect of the epicenter changed. Only one kind of grass, very much like spurge, began to grow within half a kilometer. In the middle of the summer its height reached approximately two meters. And it continued to grow, and a little farther away, shoots of other grasses could be seen. Motley grass began only at three to four kilometers from the epicenter. Local inhabitants mowed hay in the region of the explosion. They fed cows this hay. And we bought milk from them. There was no other milk. And what is more, the inhabitants themselves, just like all of us, did not know they shouldn't do this. Our children grew up on this milk.

The epicenter with naked baldness, a lime cross, and a tower remained a monument; the tower was moved several times from place to place nearer the center of the military camp. It served as a soldier's tea room, a store, a depot, and simply a platform at the stadium. In time this monument also disappeared.

An order to disband the Totskoye units of the garrison at the end of the summer of 1959 came completely unexpectedly for all of us. Tanks and other military equipment were driven to the railhead and left to winter in the open air, under the snow and in the rain. A private and several officers were assigned to the newly formed units of missile troops.

Unfortunately, the exercise proved to be secret only for the Soviet people; it is possible, therefore, that medicine was kept from a study of the effect on man of small doses of radiation and from observations on the possibility of long residence in zones of contamination with low levels of radiation. During all the time of my service in Totskoye military camps, and this was about five years, no one ever displayed any interest in the state of our health.

We had no dosimeters. Irradiation was not controlled. We ate the meat of animals affected by the explosion. We and our children drank milk obtained from cows fed affected grass. In the dining rooms and apartments, stoves burned firewood supplied from the region of the explosion.

And how that atom bomb has affected the health of the exercise participants is unknown up to now.

**Aspects of Cerebral Hemisphere Function in Man in Response to Rapid Travel to New Environment**

917C0172A Moscow PSIKHOLOGICHESKIY  
ZHURNAL in Russian Vol 11 No 4, Jul-Aug 90  
pp 60-65

[Article by V. V. Kolyshkin]

[Abstract] The functional aspects of each cerebral hemisphere in conditions of emotional stress were investigated in eight clinically healthy people aged 20 - 32 years in experiments conducted in the different climatogeographical conditions of Novosibirsk and the Western Ukraine. Psychological research techniques were employed before the flight, upon arrival, and two, three, and four days later to quantitatively assess the different types of memory in each individual hemisphere, with the purpose of determining the optimal level of emotional

stress for the function of stress-controlled memory mechanisms on processes through the emotional apparatus. The results indicated differences in the manner in which the individual hemispheres assessed emotional stimuli of equal strength in the means of their presentation. It was also shown that the selection of new information occurs with the mandatory involvement of the right hemisphere, thus suggesting that the right hemisphere is more capable of emotional reaction than the left. In extreme situations, there is a decrease in the operational performance of the left and "stable" right hemisphere, as expressed by impaired recollection of strong emotional stimuli. These data suggest that the optimal course of nerve processes involved in the reception and processing of new information needs a moderate level of central nervous system activation, primarily dependent on the operation of the left cerebral hemisphere. Figures 4; references 19: 14 Russian, 5 Western.

**Participation of Rat Thymocytes Chromatin Lipids  
in Response Reactions to Damaging Effect of  
Gamma-Radiation**

917C0259 Moscow *BIOKHIMIYA in Russian* Vol 55  
No 11, Nov 90 (manuscript received 27 Sep 90)  
pp 1962-1968

[Article by T. P. Kulagina, I. K. Kolomiitseva and Yu. S. Kaznachev; Institute of Biological Physics; USSR Academy of Sciences; Pushchino; Moscow Oblast]

UDC 576.312.31.:577.391

[Abstract] A study of synthesis of rat lipids in chromatin, nuclei and thymocytes in vitro under conditions in which the effect of labelled blood serum lipoproteins was completely excluded, under the effect of the potent damaging effect of gamma-radiation involved studies of 160-180 g

Wistar rats subjected to 10 Gy dose of radiation. Immediately after irradiation, rats were decapitated, thymus was extracted and placed in ice-cooled Krebs-Ringer phosphate buffer. The radioactive precursor of lipids synthesis [ $2\text{-}^{14}\text{C}$ ] sodium acetate with activity of 1.8 GBq/mole was added to the incubation medium in a concentration of 0.4 MBq/ml. Incubation of the thymocytes in vitro with [ $2\text{-}^{14}\text{C}$ ] sodium acetate produced more intense label incorporation into chromatin lipids than into nuclear lipids. The damaging effect of gamma-radiation caused a specific decrease of [ $2\text{-}^{14}\text{C}$ ] sodium acetate in the total fraction of phosphatidyl choline-phosphatidylserine and in chromatin sphingomyelin. The ratio of specific radioactivity of chromatin cardiolipin to specific radioactivity of nuclear cardiolipin increased. The specific change of specific radioactivity of sphingomyeline, phosphatidyl choline-phosphatidylserine and cardiolipin in the chromatin indicated participation of the lipids in mechanisms of regulation of activity of intranuclear structures. Figures 2; references 23: 12 Russian, 11 Western.

**Synthesis of Viral Hepatitis B (HBcAg) Core-Antigen by Recombinant Strain of Vaccinia Virus**

917C0272A Moscow MOLEKULARNAYA  
GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA  
in Russian No 10, Oct 90 (manuscript received  
4 Jan 90) pp 18-22

[Article by V. N. Loparev, R. R. Araslanov, I. V. Mitina,  
T. P. Antonova, N. N. Yanova, T. L. Yashina, V. I.  
Chernos, Scientific Research Institute of Viral Preparations,  
USSR Academy of Medical Sciences, Moscow]

UDC 578.891:578.74].04:615.371].08

[Abstract] Gene-engineering structures and a strain of vaccinia virus expressing HBcAg particles with antigenic and immunogenic activity are described. The recombinant strain described is planned to be used to study the mechanism of expression of HBcAg in various lines of eukaryotic cells and the molecular and immunogenic properties of the HBcAg. They will also be used for the production of viral strains expressing various combinations of hepatitis B virus proteins. It is planned to produce exposure vectors based on the HBcAg particles that represent the antigen determinants of important viral antigens such as HIV. The ultimate goal is to create

an optimal recombinant suitable for the development of an effective hepatitis B live vaccine. Figures 5; references 19: 6 Russian, 13 Western.

**Production of Group B Streptococci Deficient in Ia Antigen by Transposon-Mediated Mutagenesis**

917C0272B Moscow MOLEKULARNAYA  
GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA  
in Russian No 10, Oct 90 pp 23-25

[Article by T. N. Bulgakova, A. A. Totolyan, Institute of  
Experimental Medicine, USSR Academy of Medical  
Sciences, Leningrad]

UDC 579.862.1:579.253].083.3

[Abstract] A description is presented of the production and characteristics of isogenic B-streptococci mutants of serotype Ia that have lost the ability to generate the surface capsule polysaccharide. Transposon-mediated mutagenesis was used to obtain stable group B streptococcus mutants whose ability to produce the polysaccharide capsule on the cell surface is impaired or that exhibit specific deficiencies in the process. The mutants had 3-4 times the normal adhesion and were less virulent by a factor of 100 in experiments on mice. The bouyant density of the mutants was 1.0-1.02 g/ml as opposed to 0.79 in the initial strain. Figures 1; references 9: 2 Russian, 7 Western.

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